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CONSERVATION EDUCATION in Rural Schools

Edited by EFFIE G. BATHURST

YEARBOOK

February 1943

THE DEPARTMENT OF RURAL EDUCATION
National Education Association of the United States



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HISTORICAL NOTE

The Department of Rural Education of the National Education Association was organized at the Chicago meeting in February 1919. It was an outgrowth of the former Department of Rural and Agricultural Education, authorized by the Board of Directors in 1907. Its chief purpose is "to promote the general advancement of rural education thruout the United States." The Department meets twice a year in February and in June, and welcomes all persons interested in rural education.

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Director of Rural Service
National Education Association
Washington, D. C

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Membership (dues \$2) entitles you to receive the following publications:

1. The 1943 Yearbook, *Conservation Education in Rural Schools*
2. Official Proceedings of the Department
3. *Research Bulletin* of the NEA (four issues a year)
4. Other publications as available.

Contributors

MAY LANDERS ADAMS	Supervisor of Fayette County Schools, Fayette, Ala.
EDNA BARNES	County Superintendent of Schools, Adair County, Greenfield, Iowa
JAY N DARLING	Conservationist, Cartoonist, Editorial staff, <i>Register and Tribune</i> , Des Moines, Iowa
MRS LEONE DAVISON	Teacher, One-Room School, Zumbro Falls, Minn.
CHARLES N. ELLIOTT	Conservationist, Author Special Assistant, National Park Service, Richmond, Va.
OTTILIA FRISCH	Commissioner of Education, Saginaw County, Saginaw, Mich
KATHALINE G GABRIEL	Teacher, One-Room School, Johnson City, N. Y
R W HOLLINGSWORTH	Principal of Hubbertville School, Route 3, Fayette, Ala
R S. IHLENFELDT	State Supervisor of Conservation Education, Madison, Wis
FLORENCE K JENKINS	Principal and Teacher, Two-Room School, Canaan, N Y.
CHARLES F. MARTIN	Conservationist, Author County Superintendent of Schools, Maquoketa County, Maquoketa, Iowa
E. LAURENCE PALMER	Conservationist, Biologist Professor of Rural Education, Cornell University, Ithaca, N Y
ANNE RAYMOND	Division of Education and Information, Soil Conservation Service, Albuquerque, N. Mex.
J. GUY ROWLAND	Elementary and Junior High School Supervisor, State Education Department, Olympia, Wash.
JULIA B. TAPPAN	Division of Education and Information, Soil Conservation Service, Albuquerque, N. Mex
FRED WALE	Director for Rural Education, Julius Rosenwald Fund, Chicago, Ill
HENRY WALLACE	Principal and Teacher of Upper Grades, Two-Teacher School, Zena, Okla
JULIA B. WARE	Acting Supervisor of Elementary Education, State Board of Education, Richmond, Va.
EDWARD YEOMANS, JR	West Georgia College, Carrollton, Ga.
OTHER CONTRIBUTORS	Recognized in footnotes in connection with their contributions.

Foreword

THE AMERICAN PEOPLE have been blessed by a vast, rich, and beautiful continent. It is theirs to use wisely, to cherish, and to hand on to future generations without waste and despoliation. The ideals, knowledge, and skills of the 13,000,000 rural-school children of our country will have much to do with what happens to our land and its resources now and in the future. Conservation is a prime obligation of American citizenship.

This yearbook is for the use of rural teachers and others working in rural education. Its purpose is to present existing phases of conservation education that may prove stimulating to schools and communities desiring to put a functional program of conservation into their own schools. It does not show the status of conservation education in the United States, but it suggests sources where this can be ascertained.

The general plan of the yearbook is to indicate the major problems of conservation education, Chapters I and IV; to give specific illustrations of what specialists believe rural schools should teach, Chapters II and IV; to present reports from teachers, principals, and supervisors telling what children are doing and learning, Chapters III and IV; and to furnish sources of information which teachers and pupils can consult, Chapter V. The yearbook is not intended to be a compilation of exhortations, but rather a motion picture of the process of conservation education, with the spotlight on the activities of teachers and children successfully engaged in actual conservation.

In organizing this yearbook and selecting the contributors, the editor and the Committee on Publications and Constructive Studies have intended to have every area of conservation represented by articles or by publications listed in the bibliography. Within the limitations of space permissible for this publication it has not been possible to give representation to all states and communities engaged in conservation work.

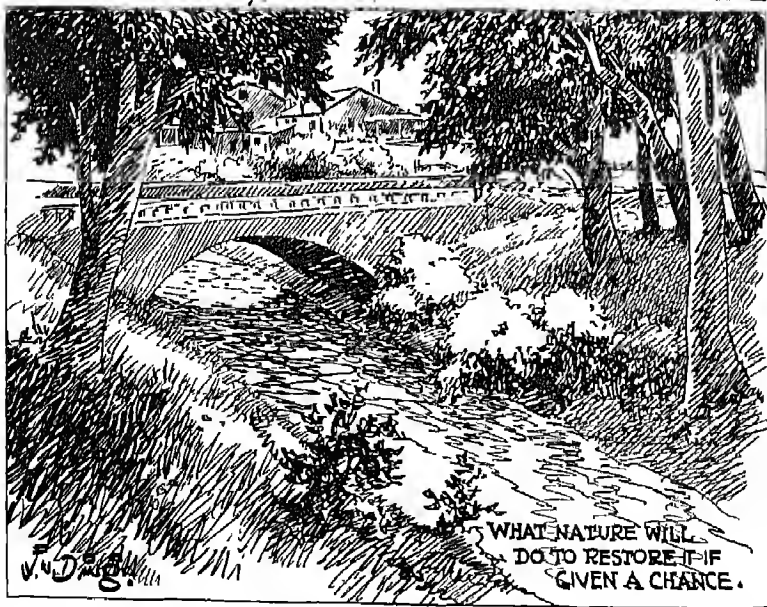
To Effie G. Bathurst, who planned and edited this yearbook, and to each of the contributors, goes the gratitude of the Department of Rural Education for this useful contribution to conservation education.

HOWARD A. DAWSON
Director of Rural Service
National Education Association

January 19, 1943

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Courtesy Jay N Dailing

CHAPTER I

Why King Midas Starved

Jay N. Darling

AS LONG AS we could pick up the telephone and get anything we wanted delivered to our door for the asking—whether it was fresh strawberries in midwinter ripened in Texas sunshine, or two-inch sirloin steaks from corn-fed beef—it seemed almost impossible to get the people of the United States to think there was any limit to our natural resources, or to take seriously the subject of guarding against rapid depletion. Since we seemed to have plenty of everything, why worry about it? Were we not the richest country in the world? Then why all this bother about conservation?

Until this war, we thought we had so much of everything that our resources would last forever. Within one short year we have tumbled from this dreamy height in the clouds and landed, none too comfortably, in a bramble bush of painful shortages, which have scratched and jabbed us in a lot of places we never even suspected had feelings.

Do you remember the old Mother Goose rhyme

There was a man in our town, and he was wondrous
wise,
He jumped into a bramble bush and scratched
out both his eyes,
And when he saw his eyes were out, with all his
might and main,
He jumped into another bush and scratched them
in again

We ought to be able to improve on the wise man of Mother Goose and do it all in one jump instead of two. Certainly we ought not to have to wait until it happens before we recognize the big hole we have made in the stock of natural resources we had two hundred years ago when we began to develop this continent. What we have already used up is going to make a lot of difference in our own living conditions and that of future American generations, who are going to have to live on what is left over.

Up to the present time we haven't thought we needed to take the warnings seriously about disappearing forests, soils, and mineral deposits. Neither did the majority of our people take this World War seriously until our Pacific islands were attacked. We like to think of ourselves as having been treacherously set upon without warning, but the warnings were plentiful enough if we had but heeded them. Ever since the powers

of aggression started to move in on their neighbors, beginning with Manchuria almost ten years ago, first the Japanese, then Mussolini and Hitler fairly shouted from the housetops what they intended to do to this world of ours.

A HERITAGE SPENT

The warnings that our natural resources are being rapidly depleted and have reached the danger point are written just as plainly everywhere across the face of our continent—in million-acre patches of denuded forests, abandoned farmlands, dust bowls, and dried-up rivers, springs, and lakes. These warnings likewise have been shouted from the housetops by the prophets of conservation, while tens of thousands of so-called "okies" (refugees from wrecked land) within the last decade have paraded back and forth before our eyes on the public highways crying for "relief." If we were really interested in anything but our immediate, short-sighted individual comfort, we would have heeded these unmistakable warnings of disappearing resources long ago.

Perhaps we should revise our hymn book of national anthems to include that old-time song, "You'll never miss the water 'til the well runs dry." Nothing that has been written describes more perfectly the typical American attitude toward our mad—yes, criminal—waste of natural resources, unless it be Benjamin Franklin's paragraph in *Poor Richard's Almanac*: "Forever taking out and never putting in soon discloses the bottom of the meal barrel."

For the last two hundred years we have been skimming the cream off the top of our continental resources at an alarming rate. We are vainly proud of the wealth thus secured but remain completely oblivious to the skimmed milk we have left behind. There is not much nourishment in skimmed milk. National malnutrition is a certain consequence, and social upheaval and economic rickets are its unmistakable symptoms. This depletion has been accomplished with greater speed and efficiency than anywhere in the previous history of mankind.

And now the war has hit us like a great hurricane. It is sweeping great paths of destruction thru what remains of our forests, our livestock, our granaries, and our mineral storehouses. We are confronted with the problem of feeding not only ourselves and our armies, but our allies and the starving millions of those little countries of the Old World whose own worn-out soils and denuded forests have been depleted thru centuries of man's consuming existence. There is no time now to stop and mend our ways of extravagant waste and unintelligent misuse of the vast blessings of nature's endowment. Our very existence is at stake and there is no alternative. We must meet this storm of necessity with everything we possess. But with this object lesson before us we can, if we will, reach a clear understanding of the fundamental principles of conservation and what they

mean in terms of human happiness and be ready to apply them when the war has ended. We will need to do so, for the final exhaustion of our national resources has probably been moved one thousand years nearer by the excessive demands made by the war. It is estimated that in one day of intensive fighting on all fronts during this war there is used up more of nature's storehouse of chemical energy, without recompense, than in a year of normal human consumption during peacetime.

It took Pearl Harbor to awaken us to the dangers of a three-year-old war which threatened our democratic way of life. With sufficient courage, determination, and sacrifice of blood and national treasure we can recover from that blow and win the war against our human enemies, but if we do not take warning and defend our natural resources from this headlong race of waste and depletion we will lose a battle from which our continent will never recover. The road back from Pearl Harbor is short and easy compared to the road back from a continent shorn of its natural resources. The Prodigal Son was lucky. He went back home to the fatted calf after he had squandered his all in riotous living. When we have spent our heritage of natural resources in riotous living, wars, and criminal waste, there won't be any fatted calf or sympathetic father to whom we can return. When we have spent our natural resources we have spent everything, and we have been and are now doing just that, with utter disregard of the consequences.

Just as it was difficult for us to believe that we were vulnerable to attack from a nation across the Pacific professing friendship, so it is almost impossible to realize that this continent, so richly endowed with natural resources, could by any stretch of the imagination exhaust its plentiful supply to the point of rationing food and gasoline, and the prohibition of articles made of iron, copper, and aluminum. No one could thoughtfully look at this continent as it stood prior to the war and compare it with the virgin continent we inherited—uncut forests, undepleted topsoils, vast mineral treasures, and rivers and coastal waters teeming with aquatic life—without serious doubts as to its eternal endurance.

Note that we are speaking of the "source" of riches rather than money, which too long has been commonly considered the mark of wealth. It is dangerous to confuse the two terms. All the money in the world would not buy King Midas a hamburger sandwich. In America today we have more money per capita than any nation of people ever had in the history of the world, but we cannot buy many of the things we'd like to have in the quantities we want. To be sure, the food shortages of today are caused to some extent by the abnormal demands of a world war, but the same shortages of the necessities of life can and will come about when our natural resources of rich productive soils have been exhausted by years of careless and wasteful practices. Productive soil, after all, is only a thin coat-

ing on the surface of the earth and can be worn out just as surely as a suit of clothes can be worn thin on the human body.

WHAT OF THE FUTURE?

An *ever-increasing* population and an *ever-decreasing* supply of natural resources simply cannot continue indefinitely without the most serious results. That old familiar boast that "America can feed the world" is like the old adage that if you start to lift a calf the day it is born and lift it every day until it is full grown, you can lift a cow. Both feeding the world and lifting a calf every day until it matures may be easy enough to start but they are going to be hard to finish.

It seems strange that we are not more concerned over this inevitable prospect, especially in this day of horrors when we see the cumulative results of worldwide surplus populations' seeking to extricate themselves from the pinch of worn-out soils and shrunken resources by wholesale murder and international burglary. Whatever the pretenses may be by which Japan, Italy, and Germany attempt to justify the slaughter of their neighbors and the seizure of their lands, the undisputed facts are plain that Japan could no longer sustain her bulging population on the decreasing resources within her island boundaries. Italy had to have expansion of both territory and food supplies or suffer ever-increasing national poverty. Germany must have land, food, and a place to send her surplus of people or accept a gradual decline in living standards and face eventual national disintegration. Each seeks now to supply her own needs by forcibly taking them from her neighbors.

Only a few centuries ago hungry, barbaric hordes from the worn-out lands farther east invaded what is now German and Italian territory and fattened on the plenty they found there. We read about them in history as the invasions of Genghis Khan, the Tartars, the Goths, and the Vandals. Since then the populations of Central Europe, Italy, and the Mediterranean states have multiplied a millionfold. The once rich and well-stocked cupboard of Mother Nature in Central Europe has begun to show empty shelves. Instead of possessing rich prizes for the invader, the peoples of Germany and Italy have become themselves the hungry invaders who prey upon the resources of others. We call it fascism, but fascism was born of shrinking resources and expanding populations.

Germans, Italians, and Japanese have learned by sad experience that a loaf, however large, can be cut into only so many slices. With all due reverence to the parables of Holy Writ, mere man has found no way to feed an ever-increasing multitude with fewer and fewer loaves and fishes.

That is the lesson which conservationists are trying to drive home to the people of this continent before it is too late. The rich topsoils, sparkling waters, abundant growth of vegetation, and minerals, which made this continent the richest prize in the history of civilization, are not inexhausti-

ble, in spite of our common habit of thinking so. Fertile soils, vegetation, and surface moisture are like beauty—only skin deep. If intelligently cared for they can be made to last indefinitely and produce abundantly. But if any one of the three is depleted by wasteful practices and slothful mismanagement, our American continent, whose "skin we love to touch," will be broken out with a rash which no sociological salve can cure. When that day comes America will not only be unable to "feed the world" but by its own standards of living will be unable to feed itself. We are already feeding more and more people on less and less soil each year. In following that procedure indefinitely we will eventually reach a danger point, if indeed it is not already here. Then economic depressions, revolutionary uprisings, and internal discontent will follow as surely as night follows day, just as these same symptoms have marked the decline of every center of civilization since the beginning of history. Many of the tragedies which have come upon portions of our population during the heartbreaking years of depression were the direct results of disregard or ignorance of the simplest conservation principles, which might have saved the dust bowl and the abandoned farms from which so many unfortunate human beings were driven.

CONSERVATION BOTTLENECK

"Bottleneck" is our favorite term right now to describe a crucial pinch in production, which chokes the war mechanism in our struggle against the Axis powers. We have been at times almost hysterically aware that a bottleneck might strangle us before we could bring our full strength to bear upon the enemies of democratic existence. "Bottleneck" packs into one word all the agony of suffocation while trying to breathe thru a too constricted aperture.

Productivity of soil is the "bottleneck" of human existence. It has been so since man's sojourn on earth began. History is one continual succession of migrations from exhausted soil to new fertile fields which nature has spent millions of years in creating. There is only one formula for production of fertile soil¹. Chlorophyl, that green pigment in vegetation, plus sunshine, has laid down all the topsoil, all the coal, all the food products of every organic living thing on which mankind has subsisted and must subsist forever. For chlorophyl is that magic green element in vegetation which alone can capture the carbon dioxide from the atmosphere and combine it with hydrogen to make all the carbohydrates which enrich the soil and keep us alive. Without the previous cooperation of chlorophyl and sunshine we could have no food, no fire, no crops, no life—nothing. When we inherited this continent we fell heir to a hundred

¹ An excellent book to help the teacher answer the children's questions about the care and improvement of soil is *Soils and Men Yearbook of Agriculture*, 1938. This can be purchased for \$1.75 from the Government Printing Office, Washington, D. C. It contains 1232 pages, written by the nation's best soil specialists, and is well illustrated.—The editor.

million years of cumulative transformation of raw volcanic rock into rich loam, grassy plains, primeval forests, a myriad population of fur-bearing animals, and waters teeming with fish and aquatic life—all the product of the chlorophyl factory. Do not forget that when this rich endowment is gone its only replenishment must come thru that same small bottleneck of chlorophyl plus sunshine.

Can any thoughtful person say that with 80 percent of our virgin forests already cut down, 75 percent of our western grasslands grazed bare, and millions of acres of underbrush cleared from our hillsides that we have not constricted the green chlorophyl bottleneck instead of enlarging it?

That is what conservation is about. Those who cite surpluses of grain and cotton to contradict the threat of shortages are only looking thru the keyhole at a nationwide, yes worldwide, problem and seeing only a very limited surplus in one small area of the earth's surface. They are blind to the estimated 600,000,000 human beings who are underfed or actually starving.

Those surpluses were produced at heavy cost to the richest remaining topsoil areas in America, while the hundreds of thousands of acres of worn-out and abandoned forests, grazing lands, and farms had produced nothing, and the populations that had once occupied them were left without employment or money with which to buy food and clothing from the wastefully produced surpluses. Robbing the rich soils to produce larger and larger annual harvests may be the most costly type of farming practiced. It was exactly that type of farming which started millions of American acres of rich topsoil down the rivers and eroding gulches to the ocean.

SHORTAGES AND DEPLETION UNANNOUNCED

In normal times of peace the threatened approach of shortages in natural resources is not announced by headlines in the daily press. Any editor of a local paper would be hung from the nearest apple tree who dared warn prospective citizens to stay away because the home town and its environs were on their last legs due to exhausted resources. Such embarrassing information is carefully concealed from the world by selfish individuals and short-sighted, local groups. Can you imagine railroads advising summer tourists not to buy tickets to the Minnesota lake districts because nine-tenths of their lakes have lost much of their once prolific fish and game populations? No land boomer was ever known to tell a prospective purchaser that the three former owners went broke trying to make a living on the ranch he was trying to sell to the fourth. Nor would an Arizona silver-mine broker reveal that the precious metals had all been taken out of the mine by its previous operator, any more than a second-hand auto dealer would tell a customer that the bearings were burned out, the battery dead, and the transmission gears stripped on a brightly painted car.

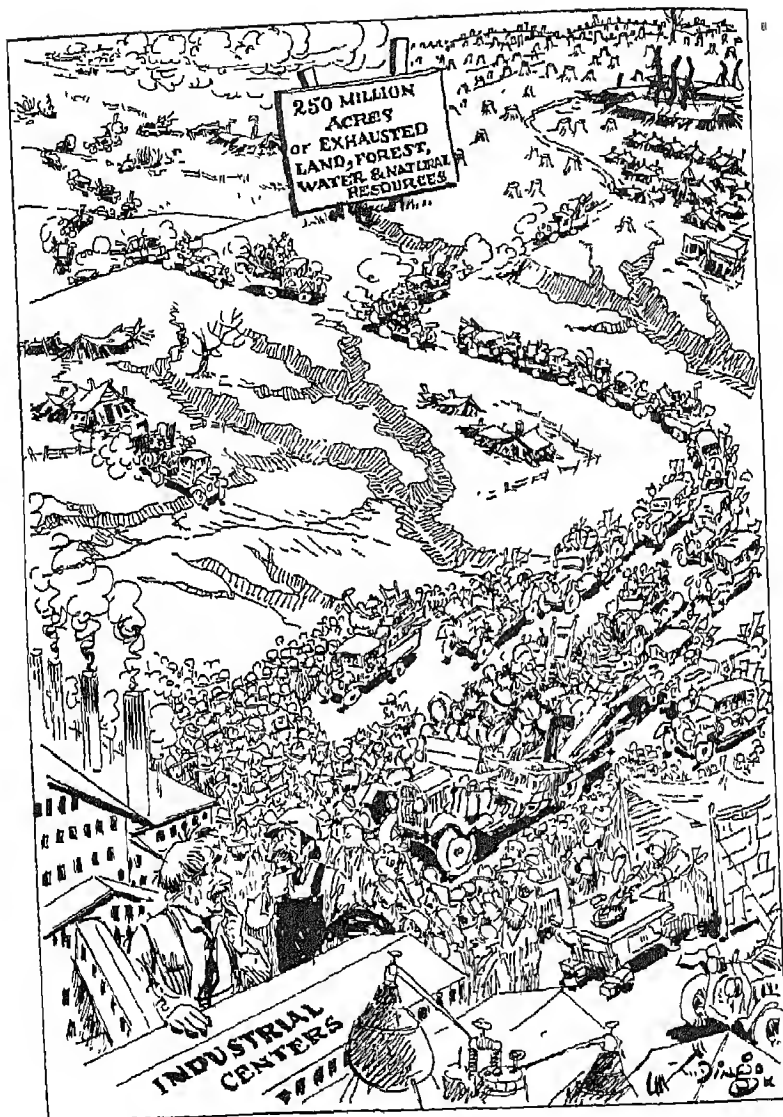
he was offering for sale. Florida does not advertise that it costs more to fertilize the orange groves in that state than you can get for the ripened fruit, and Iowa is careful not to let anyone know that the southern third of its farmland has been so badly eroded that whole counties have gone on relief and that many of their schools, churches, and other local institutions are bankrupt.

The U. S. Reclamation Service does not publicize the number of irrigation projects which are not always good conservation projects and frequently have cost the taxpayers millions and then wrecked the family fortunes of the settlers who tried to farm the irrigated lands. The National Forest Service does its best to arouse the public to the dangers of forest fires but it does not emphasize the fact that forest fires are taking toll of our American forests faster than nature, with the assistance of the U. S. Forest Service and all the state forest departments, is growing them. Thus it happens that the people of this country have remained in ignorance of the progress and extent of destruction, which has pulled from under them the sustaining foundations of their prosperity.

As a nation we did not concern ourselves with what was to become of the army of lumberjacks, sawmill operators, local storekeepers, school-teachers, and village inhabitants when the great forests of Michigan, Wisconsin, and Minnesota were all finally harvested and cut into lumber. Even less conscious were we of the fate of the thousands of families of the once prosperous fishing villages on the southern shores of Lake Erie when suddenly the prolific runs of fresh water herring gave out and fishermen, boatmakers, net weavers, and associated workers were left without any means of livelihood. Ghost towns that were once thriving fishing villages line the coastal waters of the Atlantic, the Pacific, the Great Lakes, and our major rivers—each one a tombstone to exploited and dead resources.

"Abandoned farm" is a familiar term which has fallen upon our ears and slid off with no more effect than a drop of water on a duck's back, but a single abandoned farm is sodden with tragedy and suffering for the members of the farmer's family who could not make a living on it and had to abandon all hope there. Multiply that tragedy by a million abandoned farms (there are many more than a million in this country already) and that term "abandoned farm" assumes a foreboding significance which we as a nation have ignored.

Need we mention more examples in order to be convincing? It could be done until every nook and cranny of our continent had been shown to be the victim of circumstances similar to the Minnesota forests, Lake Erie herring, and abandoned lands. Each in its turn inflicted no stunning blow to our national economy as a whole but the cumulative effect of all of them together has built up a total of profound significance. The early symptoms are as insidious in their approach as a creeping paralysis whose earlier effects are only inconvenient but which finally paralyze the whole



Courtesy Jay N. Duling

*Don't Blame Factories for
All the Unemployment*

body By the same token, the day when everyone in the United States will go comprehensively hungry is a long way off, but the widening margin of our population who do go underfed because of disappearing forests, land, and water is gaining new recruits by the hundreds of thousands annually. The climax of exhausted resources will be violent and without mercy. Once that climax is reached the restoration is as slow as the ages of nature

WHAT IS CONSERVATION?

We know now that much of the rapid exhaustion which has taken place in America was entirely unnecessary, due largely to ignorance and wasteful practices which could have been avoided without loss to current profits. If we begin now the intelligent application of the principles which might have prevented the past waste, we can at least insure continuity of use of what we have left. We possibly can accomplish a restoration of some of that which has been lost. It is the application of such principles and practices which, grouped together, is called "conservation."

Conservation is an organized campaign to widen the bottleneck in the economic mechanism for national welfare. If the bottleneck cannot be widened, at least it can be kept from growing smaller.

Conservation is not just a sentimental hobby nor a fanciful hope of idle dreamers, of duck hunters, of fishermen, or bird lovers. Conservation is a science whose principles are written in the oldest legal code in the world—the laws of nature.

Ignorance of the laws of nature has been, and still is, more responsible for the violations than wilful malpractice. It is therefore necessary before any real progress toward conservation can take place that the schools shoulder a large part of the responsible burden. They must educate their students for conservation; prepare them to accept and work for improved care and use of the natural resources. It is obviously hopeless to divert our mass population from their ingrown destructive habits when they are not aware of either the natural laws or the dire consequences of their violation.

How the schools shall accomplish this task is for teachers and professional educators to determine. Suffice it here to say that the job must be done, and soon. It is the job of scientists to interpret and correlate the natural laws in such form that the educators may make them clear to the oncoming generations. In a large measure the natural scientists are far ahead of the educators with their work. For instance, scientific research has determined by experiment and proved by demonstration that plants have a vital influence on moisture in the soil, one of the most important relationships in human welfare. But too many botany teachers still occupy the minds of their pupils chiefly with identification of species and grade the students accordingly. There are geologists, who, altho water is the most

precious substance within their sphere, ignore it almost entirely and drill their classes on such things as the relative hardness of horn blend and talc, and how to distinguish fluorite from feldspar by the number of facets to their crystals. In the instruction they give they fail to relate minerals to economy of use and to human welfare. Biologists, whose province is the teaching of the interrelationship of all living things, are inclined to wander off into that rarefied atmosphere which surrounds the eternal mystery of when and how life enters protoplasm. Yet within the natural and fundamental laws of such common-school studies lie the secrets of droughts, floods, dust bowls, eroded topsoil, deserts, national destitution, and human despair. Young children can understand the simple basic concepts, older children and youth, the laws.

Why are so many of our fresh water springs, once perpetually flowing, now dry? Why do rivers which within our memory once flowed bank full the year round now dwindle to nothing in midsummer? What man-created influences have caused a continuous and rapid falling of the sub-soil water table of our continent? What has happened to nature's balance in the great stretches of western grasslands which has made them dusty wastes and their ranch houses vacant? How long will it take to replace the nine inches of rich topsoil which have been washed off the farms of the Mississippi valley? How can it be done? What essential function to life do green leaves perform without which no human being could exist? What is the source of all sugar, starch, fat, coal, and oils and is there any substitute method of production which men can provide? Why are there no more salmon to speak of in the Atlantic Coast rivers of the United States of America? Why do lakes which once had crystal waters and an abundance of aquatic economic resources now grow green scum and support no fish? What has become of the millions of people who once lived on the now abandoned farm lands, denuded forests, and fishing waters?

The answers to all these and many more questions like them are intimately associated with the four basic natural sciences and are now written so that anyone who cares to may read in the simple language of the natural research scientists. And the fate of our future generations rests upon their *application* to everyday living. Surely the elementary schools of the nation have a duty to perform here.

WHY CONSERVATION LAGS

Research scientists have gone a long way to provide formulas by which conservation can be accomplished and show how man can keep natural resources working for us instead of destroying the intimate mechanism. The public, hydraulic and sanitary engineers, industrialists, and educators have been slow to apply these vital essentials to man's existence, while our population grows larger and our productive resources shrink.

It is one of our peculiar misfortunes that education in the fundamental principles of conservation has not reached the average congressman or the state and local government officials in whose hands rests the administration of our conservation policies. Maybe they were absent on the day that subject was mentioned in school. So many promotion projects are labeled "conservation" but are really just the opposite of conservation and neither our elected officials nor our general public knows the difference. Yet the fundamentals are as easy to understand as the fact that long grass will gather and hold more snowflakes than short grass and hence provide more moisture in the soil for the next season's crops, or that water without oxygen is as bad for fish to live in as a room without oxygen is bad for man.

I could tell you of an experimental area of 35,000 acres of land which ten years ago had not a spear of grass visible, wherein seven flowing springs had gone permanently dry and life was practically extinct thru overgrazing and mismanagement. That same 35,000 acres is now knee-high with lush vegetation, the seven springholes are again full of water the year round, and a thousand head of cattle could be fed without overgrazing. It didn't take any fertilizer. It didn't take any twenty-five-million-dollar irrigation project to restore it to production. Only an application of the simplest principles of conservation management was necessary. This was accomplished in spite of continuing drought conditions in the region.

If you want to know how simple that process was, it involved nothing more than keeping the herds of cattle and sheep off the area to give the grasses a chance to come back. The sparse grasses grew the first summer enough to hold the snows that fell that winter. The snows melted and went into the ground instead of running off (again vegetation aiding in the absorption of moisture by the earth). The extra moisture in the soil stimulated an increased growth of native grasses and vegetation, which in turn held more of the following-winter's snows. The water thus stored in the ground finally reached an excess which seeped out into the old springholes. That was all; but if we had not known the relationship of botany to soil and the teamwork between plants, water, biology, and soil, we wouldn't have thought the restoration possible, or at any rate so easy. Those same principles are, of course, subject to much wider application than this little demonstration.

A FEW AXIOMS

Let us see if we can outline a few conclusions which will fix in mind the objectives of conservation and the processes which are essential to its accomplishment.

1. No nation can permanently endure which consumes its natural resources faster than nature, with scientific aids, can replace them, any more than a man

can live forever on a barrel of flour without ever putting more flour into the barrel

2 Conservation is the science of greatest possible production without diminishing unduly the source materials.

3. Conservation seeks by the application of natural laws to provide methods by which continual production may be substituted for destructive exploitation.

4 Conservation is the exponent and advocate of careful scientific study and diagnosis before major operations are performed on our basic economic mechanism

5 It is essential that whenever nature's productive balance is invaded, adequate replacements or equivalent substitutions be provided as insurance against diminishing returns

6 It is a primary requisite of conservation that no project which makes use of natural resources is justified if its cost to the people of this nation is greater than the local profits and national benefits

All these seemingly axiomatic precepts are, as a matter of fact, just another way of saying that you can't feed and clothe more and more people on less and less productive resources.

To the newcomers who approach these more serious aspects of conservation for the first time, the emphasis on food production to the neglect of mineral resources may cause some questioning which should be answered here

Resources of nature are divided into two classifications those which are renewable by human efforts and those which are not renewable. In a measure, all organic resources are renewable. Forests can be replaced by reforestation; grasses and surface vegetation if destroyed can be replanted if not too long neglected. Furs of wild animals can be replaced by wool from domestic animals or textiles made from vegetable matter. Depleted animal life can be renewed by scientific breeding and restocking. Even soil depletion can be, in a measure, renewed under advantageous conditions by prescribed vegetation management.

On the other hand, the mines which produce our inorganic or mineral resources, such as silver, aluminum, iron, tin, zinc, and kindred elements, cannot be restocked. They are therefore classed as nonrenewable resources. There are, to be sure, dangers which threaten serious inconvenience if by mismanagement and waste our stocks of essential minerals run short, but these hazards concern industrial production rather than the essentials to sustain life.

I venture to say that no one would like to contemplate living in this modern world without the conveniences provided thru industrial production. If that would be bad, think how much worse it would be to live in a world from which the supply of food, fuel, and clothing had been exhausted. Hence the emphasis on "renewable" resources, for if you do not "renew" your "renewable" resources you won't have any use for the

"nonrenewables" anyway King Midas found that out when everything he touched turned to gold and he could not eat.

Considering the almost unlimited possibilities for substitutions in the field of minerals and inorganic, nonrenewable materials, we can say with considerable degree of confidence that there will be no bottleneck, in the long run, of metals for industrial needs and human requirements, at least in times of peace. Only the sudden excessive demands of an unforeseen war created our present mineral shortages, a deficiency which is rapidly being remedied.

It is unfortunate, however, that in the process of producing substitutes for metallic materials, an extra strain is put upon the organic sources of materials, where the real bottleneck is located. Running thru the whole scale of new plastic materials—rayon, nylon, lucite, phofilm, and the bakelite group, to mention only a few—the constituent elements are chiefly of organic origin and every known organic substance, living or dead, has come and must continue to come thru that single agency of green leaf chlorophyl plus sunshine. If there were any virtue in wishing, we could wish that our alchemists would pick on something besides carbon to transmute into mineral substitutes. Everybody wants to use carbon for something or other and no one has ever been able to make any.

In the field of heat, energy, and power production, there is no fuel which is not of organic origin, with the possible exception of mineral oil, whose mysterious origin has not been satisfactorily proved. Both coal and oil must be classed among the nonrenewable resources and any substitutions must come from the organic or vegetable family. Synthetic gasoline, the alcohols, and all combustibles are made from organic matter. Then add further to the strain on the organic bottleneck all the foods we eat (whether animal or vegetable), all textiles—linen, cotton, or wool—all the millions of tons of paper used daily, all the gunpowder, cigarettes, and feathers on women's hats. To put all expended energy also on the list would involve some duplication of the above list, but its drain upon organic resources is so vast a daily item that it should not be neglected in the comprehensive concept. From the tiniest flip of a fish's tail to the throbbing engines of the largest steam turbine in the world, every move burns up, directly or indirectly, some of the organic matter laboriously produced by the minute green cells in leaves. Let your imagination dwell for a moment on the "man hours" a chlorophyl cell would have to work to produce the energy dissipated in the explosion of just one "block-buster" aerial bomb.

Picture then in your mind this vast army of human demands lined up like a breadline before a soup kitchen and waiting to be served by that sole producer of relief rations, the green pigment in vegetation, and you will get a new conception of what a bottleneck means. There is no other source. Without soil and water there is no vegetation; without green vegetation there is no chlorophyl; without chlorophyl there can be no new

supply of organic energy. Every grassy plain or forest denuded of its vegetation and every marsh drained of its water by man's wasteful practices constricts the bottleneck. Every careless farmer who by negligence allows the topsoil to wash from his land shortens the period of time that his soil can help contribute to human needs

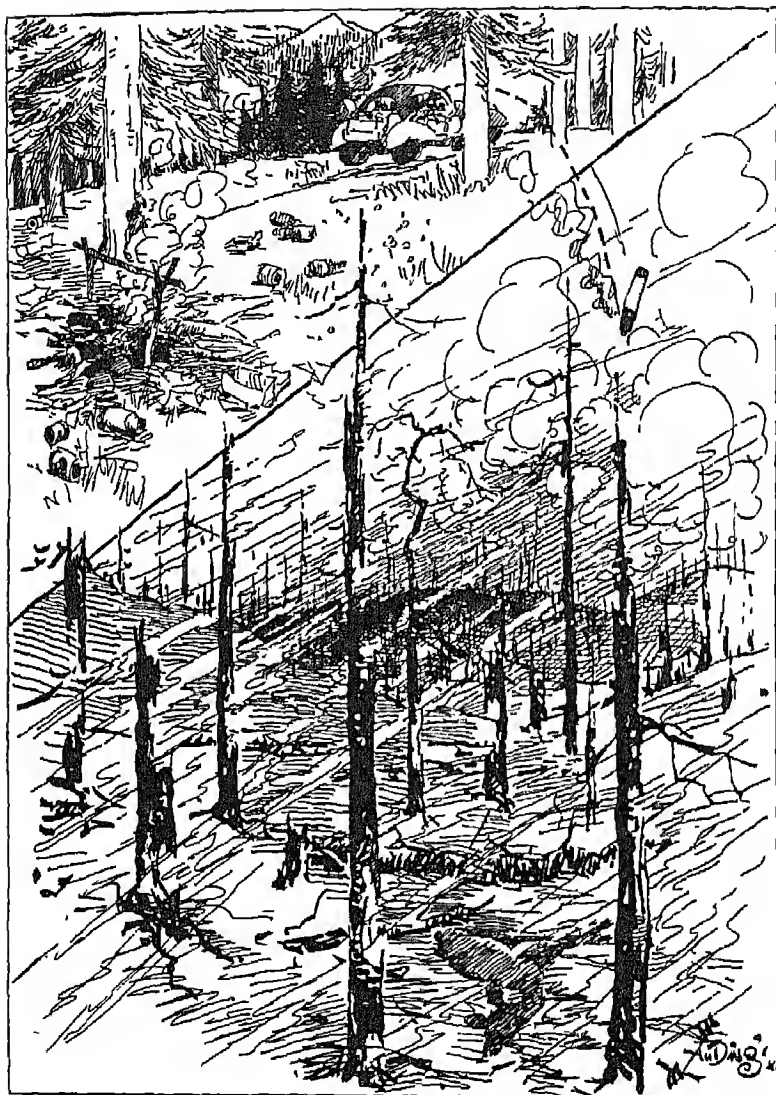
Among modern current events I can think of no more excruciating mental agony than must have been suffered by those battered troops on Bataan Peninsula in the Philippine Islands, scanning the skies to the east in vain for the relief planes which never were to arrive. That is very real to all of us, and tragic in our total helplessness to aid. I wish it were possible to dramatize for you the utter hopelessness of our situation on the North American continent when thru failure to heed the conservation warnings the pinch of organic shortages overtakes us all and from which no relief will be immediately available. I do not wish to convey the idea that we in America are in any danger of going comprehensively hungry for many generations, but social calamity will not wait for that. If we allow a hungry margin of our people to go continuously underfed and do not prevent that margin from growing wider, the jackals of discontent will be at our doors. The Old World's hungry margin is very wide. Ours is just beginning to show, but it is getting wider with each passing generation.

CONSERVATION—TODAY'S FRONTIER

There was a time when population pressures on this continent were easily relieved by opening up new lands. Today there are no new frontiers except the almost untried frontier of conservation. We must sit down where we are and plan our subsistence for the next ten thousand years on what we have left of our organic resources.

Don't take too much comfort in that deceptive term "renewable" resource. There isn't much virtue in the renewable quality of resources if we don't renew them, particularly if, while not renewing, we also destroy the renewal mechanism by erosion, fire, drainage, and soil robbing.

Today we are all busy with war. Everyone is employed, or should be. But tomorrow when the war is over we shall be again confronted with the problem of peacetime employment. The trials of the late depression are too recent not to be remembered. We blamed the rich; we blamed capitalism. We blamed Wall Street, the Republicans, bankers, and everyone else except ourselves. But no one seemed to take into consideration then that by our own wasteful practices with forests and soil we had thrown a vast proportion of the unemployed out onto the highways looking for a living. Work and the ability to produce wealth will continue to exist on this continent only as long as the natural resources of our soil and water yield up their riches in proportion to the requirements of our population. Nor did anyone take seriously the fact that our population had increased by leaps



*Yesterday's Paradise—To-
morrow's Black Desolation*

Courtesy Jay N Darling

and bounds until our productive soils, grasslands, and virgin forests had shrunk by at least 90,000,000 acres within the last decade. No, it wasn't all Wall Street, Republicans, Democrats, and capitalists who were to blame. The same dust bowls and cutover forest lands where people could no longer exist would have been vacated and the people destitute under socialism, communism, dictatorship, or monarchy if the people themselves had been as wasteful and heedless of nature's laws as they have been under democracy.

Did you ever play "Going to Jerusalem" (some call the game "Musical Chairs"), where the guests at a party march to music around a double row of chairs, which contain fewer seats than there are guests? When the music stops everyone tries to sit down. Because there are fewer seats than there are players, somebody generally sprawls on the floor or is left standing without any chair. Then another chair is removed, the music and marching start again, and so on until there is but one chair left and two people to sit in it.

Apply that same picture to 130,000,000 people trying to find life and sustenance on less and less productive acreage. We will be playing that game again when the war is over and it will be serious business indeed. The exploitation of resources for war in the interest of national survival has exceeded any peacetime exploitation we have ever known and the population margin that will be left unprovided for will be greater than ever. We will try to guarantee jobs for everybody, but way back behind our whole economic, social, and political structure lies the fundamental requirement of natural resources, and jobs can only be provided as long as that backlog of resources remains.

In our desperation, following our customary pattern, we will juggle the currency, we may try substituting dictatorship for democracy, we may set up devices for redistribution of wealth and social security, but none of them nor all of them put together will restore the soils and other resources we have so wastefully depleted. Such inventions of the sociologists and economic doctors will be of no avail in reforesting our eroding hillsides. They cannot reclothe the dust bowls in protective vegetation by social reform or "sharing wealth." They cannot bring back the eroded topsoil which has been carried downstream and deposited on the Mississippi delta. Unless our streams and rivers start to flow uphill we'll never get that soil back on the abandoned farms. Only an aroused public consciousness to the dangers of wasteful practices can help us in our extremity. And an aroused public consciousness is impossible without an understanding based on a broad national education of the oncoming generations.

Conservation becomes then, not a matter of sentimental appreciation of the beauties of nature. Neither is it an idle humor of cloistered scientists in their experimental laboratories. It is grim business for statesmen and government executives and we won't have statesmen and executives who

will know what it is all about until the teaching fraternity takes over the job of educating a new crop.

A HISTORY LESSON

Some day a new historian will arise who will revolutionize our study of the past and give us a much better understanding of the problems which we ourselves are meeting. This new historian will give an interpretation of the causes which produced the events, rather than a compilation of dynasties, wars, and victorious generals. Instead of telling us in detail *how* Genghis Khan and Alexander the Great fought their battles, the new historian will tell us *why* they fought their wars of conquest. And the reasons will exactly parallel the causes which led the Japanese to invade the Asiatic continent, the Italians to slaughter the Ethiopians, and Hitler to shatter all the international covenants to loot Europe. From the first racial conflicts of written history on down to the present day, wars have sprung from the same background, namely, an increased racial population wearing out its natural resources and relieving the pressure within by arming its surplus men and moving in on the less depleted pastures of its neighbors.

Archaeologists tell us that this process started in the Gobi Desert, and whether or not that was the cradle of the human race, the fossilized remnants of profuse vegetation and abundant animal life are all that remain to show that man once lived there in obvious abundance until depleted natural resources forced the inhabitants to seek new land. Out of this area came successive waves of migrations which moved westward into Mongolia, India, Persia, Arabia, Turkistan, Palestine, Mesopotamia, the Nile and the Sahara, the Caucasus, the Mediterranean states, and finally into what we now call Continental Europe.

Buried in the dust and rubble of ages along these ancient migration lanes are crumbling palaces of kings and buried cities which once housed large and thriving populations. Those old ruins where millions once lived furnish convincing evidence that what now are nothing but desert lands, were once sufficiently productive to maintain prosperous communities. There today you could hardly pasture a healthy Dakota grasshopper. Fabled lands "flowing with milk and honey," the valleys of the Ganges and Euphrates, Arabia, Persia, and Babylon were not always the deserted wastes they are today, inhabited only by struggling remnants of the former hordes now searching an exhausted land for sustenance for their flocks and a meager livelihood for themselves. Architects and artisans did not go off into a desert to erect such majestic designs in masonry as mark the remains of Bagdad. That mecca of an ancient civilization was once surrounded by productive agricultural plains. We did not invent the dust bowl in the United States.

What vast natural resources must have blossomed on the sandy wastes

of Egypt to support the armies employed to build the pyramids! For every stone in their huge bulk there must have been at least a hundred acres of land in full and continuous production to feed the laborers who quarried the rock and hoisted it into place. Let your imagination fill the gap between these vast operations during the building of the temples of Karnak and the present flea-bitten remnant of Egypt which dips from the Nile enough water to raise a handful of rice, the per diem ration of its remaining population.

Few know that the mysterious city of Timbuktu, a ghost town of prehistoric origin isolated by miles of arid waste in the middle of the Sahara Desert, was once surrounded by fertile fields and olive groves. Buried beneath its desert sands is complete evidence that Africa's great dust bowl once was as rich as the Mississippi valley. Giant primitive forests, lakes, and rivers once spread across the vast wastes of the Sahara.

Between the Gobi Desert and Mesopotamia, a thousand Genghis Khans, Attilas, and Nebuchadnezzars fought for the riches which these ancient lands once produced. They wouldn't be worth fighting for now if it were not for the oil deposits (of which the ancients had no knowledge) hidden deep beneath the earth's crust.

Is it just a coincidence that those once rich lands where civilization has lived the longest are all deserts now and unable to support a one-thousandth part of their former populations, or is there a lesson which we have overlooked hidden in crumbling ruins of departed civilization? Could it be that our own falling water table, dried-up springs, man-made dust bowls, and abandoned cattle ranges are the early symptoms of the same blight which turned the ancient garden spots into deserts? Scientists who have read the hieroglyphics written in the sands of time say it is not a coincidence but an invariable rule. Other scientists, seeking a formula by which we may avoid such a future, have given us assurance that, taken in time, soils, vegetation, and subsoil water tables can be made to persist indefinitely and yield a balanced production of life's necessities.

The point will be raised by some that geological and meteorological changes may have occurred to alter the annual rainfall and that in this manner the once habitable lands of the Old World became deserts. No one will seek to dispute the possibility of a reduced rainfall in those regions and its potential contribution to the present conditions. But within the last decade much research work has been done to shed new light on that question, only a suggestion of which can be included here. Investigators have found that heavy rains still fall on those desert wastes. Deep erosion gullies and the surface of the land scarred by ditches cut away by rushing waters will be remembered as one of the characteristics of much of the Old World desert areas by anyone who has traveled there. Measured calculations have shown that enough water still falls in cycles on many of these so-called desert areas to sustain a fairly satisfactory vegetation—if those

rains could soak into the ground instead of running off. Research workers now contend that it was the disappearance of the vegetation thru man's overuse which changed the environment and not the lack of rainfall which destroyed the vegetation.

Fragmentary translations of ancient hieroglyphics give hints of further illuminating data on internal conditions which preceded those early tribal migrations when lands became exhausted. They are the only hints but they tally so accurately with known cycles of modern social upheavals that they leave room for more than a suspicion that there is a standard cycle of social and economic phenomena directly associated with the disappearance of natural resources.

One of the first things that always happen when populations outgrow their natural resources is that the existing government is overthrown, which usually is accompanied by throat cutting and broken heads. That seems to have been standard practice down thru the ages, and it still is. Spain has given us a complete dramatization of this part of the cycle of social evolution during the last decade.

Boiled down to the fundamentals, the history of civilization since man was created is largely made up of the rise and fall of governments, kings, and empires thru the exhaustion of natural resources. History, therefore, in reality turns out to be the story of hungry man in search of food. Conservation is the job of so managing the soils, waters, and gifts of nature on this continent that our search for these necessities shall not include murdering and robbing neighbor countries.

If we do neglect conservation, as history has ignored it in the past, and any considerable portion of our population does seek in vain for subsistence, we shall have increasing poverty, social upheavals, and *in spite of our high ideals and worship of peace* we shall have *more* wars instead of *fewer*, for wars are the spawn of empty stomachs, and empty stomachs follow, as the night follows day, the excess of demand for natural resources over the supply. Sociologists and economic doctors should study biology.

No one can look at this continent today, compare it with the way we found it, and deny that we have ruthlessly ignored this law of nature. America is no richer than her remaining resources.

Hunger has, since the world began, thrown men at each other's throat. Hunger, or the threat of it, has been and still is one of the compelling forces back of racial struggles. Comparative peace reigns in all the biological world until the competition for sustenance precipitates a death struggle. America is not exempt from this rule of nature.

CONSERVATION EDUCATION

It is impossible of course to include in such a general discussion as this attempts to be, the details necessary for adequate teaching of conservation. I would like, however, to call the attention of teachers and other educators

to the fact that such material should be a part of all common-school curriculums. If it is not found in any course of study of a school system, it is evidence that the school and the teachers are contributing to the destruction of our natural resources by their failure to produce an enlightened generation of children. In this connection I will have to admit that to my knowledge such material has not yet been adequately provided in most school programs. Some of the research scientists have attempted to write the textbooks needed, but have fallen short of the desired end and aims because they are not sufficiently skilled in the modern educational technique. Probably in addition to teaching the principles of conservation it will be necessary for the educators themselves to evolve methods and texts required for common-school purposes. So far as I can see, the teachers are the only missionaries we have who can convert a sinful and sinning public to an orthodox faith in applied natural science.

There are difficulties in getting the real job of conservation done and it probably cannot be done at all unless the teachers of America, and especially the rural teachers, are willing to take upon themselves the responsibility for the major part of the work which lies ahead. Don't let that "large responsibility" scare you. It is right down your alley. You will not be expected to go out and stop the building of useless hundred-million-dollar dams with your bare hands nor tangle with political problems. All you are asked to do is to find a way to teach the principles of conservation to your classes.

In other words, we must begin at the bottom to build up a comprehensive understanding of the problems which we have been reviewing in this discussion. Up to this time the conservation advocates have been trying to develop a nationwide appreciation of the subject by pouring it in from the top. Most of it has run off, like water from a duck's back. After a generation has reached the adult stage its members are too busy with the affairs of living to take on a new layer of education. If a nationwide job of conservation is to be done, the principles will have to be instilled in youth in the public schools. Men and women who have toiled long and diligently for the cause of conservation have come to the conclusion that unless we can begin with the youth of this country and have them grow up into a nationwide majority, with an understanding knowledge of the fundamental principles of conservation, we will go on wasting and squandering our soils, waters, forests, and other gifts of nature until it is too late to mend and patch and restore.

Most of the conservationists' boasted activities up to date are badly overrated. They really have gotten nowhere toward the main fundamental objectives of applying conservation to our North American continent. Organized groups of conservationists have tried every method imaginable. They have preached their doctrines and shouted their warnings to adult audiences from one end of the country to the other. But you cannot edu-

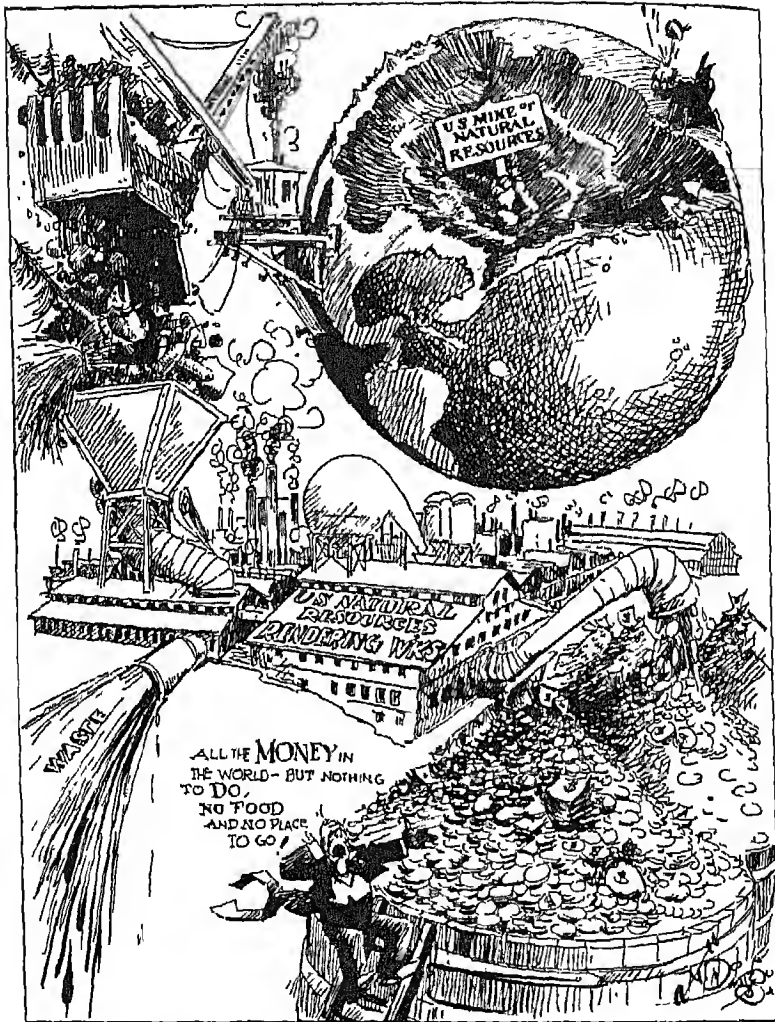
cate the public in the principles of conservation in a banquet speech nor move the mass opinion of a nation by a series of lectures on a chautauqua circuit. We have begged, prayed, and fought with congressmen and presidents, governors and mayors, but all our campaigns have fallen far short of the goal.

You have probably felt quite comfortable in your minds about it all because you were constantly reading or hearing about the works of the Audubon Society, the American Forestry Association, the Izaak Walton League, and the federal government agencies and bureaus such as the Soil Conservation Service, the National Park Service, the Fish and Wildlife Bureau, and many others. My hat is off to all those groups who have fought the good fight against heavy odds, made some gains, but have always lost the major decisive battles. I ought to know for I have been a worker in the ranks of all of them, and a national director in many.

What they have accomplished is all good, but because these small organized groups were not strong enough alone to defeat the confirmed American habit of mass exploitation, what we have lost has been as a mountain is to a molehill of gain. I mean by that statement that in every subdivision of government in this country, from the average county supervisors up to members of Congress and the presidents' cabinets, the exploiters got the millions and the conservation projects got the pennies. And what has been the reason? The general public, ignorant of both the need and the principles of conservation, was on the side of exploitation, and politicians will always be found trying to please the majority of the voters in order that they may get their votes at the next election.

We ought to be grateful that it has been this ignorance rather than wilful waste that the battles have gone against us. We can correct ignorance with education but we haven't yet discovered the cure for unbridled selfishness. So I say again to you teachers of the great educational system of America, that you, who more than any other agency in this land have the opportunity and the power to mold the thinking of the oncoming generations, will have to accomplish the job for conservation where all others have failed. The people can have conservation if they want it. And if the people of this land understood what it means in terms of living conditions for all time to come, there would be no question of their wanting it.

To teach them to understand is your job. That must be done first before the organized conservation agencies can make any headway toward the excellent national programs of conservation which have been planned these many years but never executed. Our one hope is that within the great army of teachers there will be many who will take upon themselves the responsibilities involved, and with courageous leadership show the way to make conservation a universal part of the public's education.



Courtesy Jay N. Dailing

*How Rich Will We Be When
We Have Converted All Our
Forests, All Our Soil, All
Our Water Resources and
Our Minerals into Cash?*

CHAPTER II

Teaching Conservation of the Natural Resources

E: Laurence Palmer

LIKE THE GOOD FAIRY TALE, every conservation education program should end with the statement, "and they lived happily ever afterward." Unlike the fairy tale, conservation education offers us all the opportunity to make the ideal become a reality; and, unlike the moral which used to follow many tales, if the lessons of conservation education are not learned and heeded, few if any of us will be able to live happily much longer.

OF WHAT DOES CONSERVATION EDUCATION CONSIST?

Let's be specific to help us reach a definition of conservation education. A government agency once issued the statement that it took probably five hundred years to form an inch of topsoil. A subsidiary government agency ran an experiment on some abandoned woodland which confirmed the original figure that it might well have taken nature five hundred years to form an inch of topsoil on this wooded land if left to itself. Since few of us are likely to live for five hundred years, we are not likely to be able to live to see an inch of topsoil produced by this technic and as a result we lose interest. To be sure, we may become concerned when we are told that a good shower may easily wipe away the accumulated soil wealth of a few centuries, but the time span involved in soil production by nature is just too great to make us feel that our efforts for the present will materially affect the situation. It's all very well to plan a farm for our great-, great-, great-, great-, great-times-five grandchildren but what we want is something for our old age.

Fortunately for this soil situation, we know that in England and in some parts of the United States rich topsoil is now being produced from subsoil at the rate of about one inch in two years. This fact gives us encouragement to go out and do something about it with the realization that we can see satisfactory results without the use of a microscope.

Should we follow the philosophy that every inch of topsoil represents the accumulated wealth of five hundred years, our conservation education will of necessity have to be academic. If we follow this philosophy (and carry our thinking no further), we will put much time in wishing for the return of the so-called "good old days" when buffaloes and Indians roamed the plains. We will worry ourselves sick over the fact that the passenger pigeon and the dodo and a few other species are gone forever. We will

write mournful essays about the decrease in numbers of the world's supply of whales while we do nothing to maintain an optimum population of quails in the fence rows on our home farms. This academic conservation education does not tell us how woodchucks help rabbits survive the winter. It fails to show us how a trout stream may be made to support a greater fish population. It uses pictures of the rice paddies of China and the grape terraces of the Mediterranean to show the advantages of farming on the contours while local hills are ruined by sheet and gully erosion. True, this type of education may be better than nothing and it may sometime get us where we wish, but it is too much like the five-hundred-year-per-inch topsoil to be truly effective in a world so dynamic as is ours of this century. The woods, fields, and waterways and the earth beneath these are full of real opportunities for superior teaching by the rural teacher if only a sound philosophy is followed.

When Louis Agassiz opened his famous summer school on the island of Penikese, he told his students, "I shall never ask you to repeat what you have been told but will constantly ask you what you have seen for yourselves." That statement should be kept forever in mind by the teacher of conservation and should provide a means of salvation to every rural teacher. Followed to its logical conclusion, it means that vicarious experiences thru books, pictures, and lectures are out as teaching techniques except to supplement direct experience. Rather, it means that the fields, woods, and streams are the books to be studied and Agassiz's dictum, "Study nature, not books," finds a perfect opportunity for expression and satisfactory demonstration in the well-taught conservation class.

The Tennessee rural-school teacher whose schoolyard was riddled with gully erosion but could not teach conservation because she had no materials at hand, and the California school principal, who wrote that they did not teach conservation in his town because the town was an oil town and did not need it, both failed to use the imagination necessary for good teaching. If conservation education fails in rural areas, it will fail largely because of the rural teachers' inability to visualize and to use the opportunities that are to be found on every side. True, our urban population needs conservation education as much or more than does our rural population, but urban areas are more remote from much of the raw materials which are produced for the support of our modern civilization. The rural teacher's job in this aspect of the whole education program should at least be simpler than that of the urban teacher. The materials and the problems are at hand for the using.

Like most subjects in schools, conservation suffers from the limitations possessed by the specialist and the equally great limitations of the generalist, with his "survey" ideas and his conviction that repetition of generalizations assumes an understanding adequate to the situation. The teacher

must select from the offerings of all these, just those things that are pertinent locally. Since there is no typical American rural-school community, there can be no one conservation program which can be followed everywhere. What may be a real conservation problem in one community may be nothing of the sort in another. Conservation work in schools may also suffer because it is recognized as within the realm of the social sciences as well as in the natural sciences. In about half of the teacher-training institutions conservation work is offered in social science departments, in the remaining half, in the natural science departments. While this situation complicates the duties of the teacher, it also is valuable as it provides a natural vehicle for the type of general education which is recognized as an essential product of our public-school system. Here, we find a combination of the social and the natural sciences.

ADAPTING INSTRUCTION TO TIME AND PLACE

As suggested earlier, no one type of conservation education can be applied everywhere. This applies to relatively small geographic areas as well as to great portions of our country. In almost every community there is some place where there is too much water while in others there may be too little. The first place may be a spring or a seepage or even a place where water from a leaking faucet continually supplies more water than is to be found in adjacent territory. On the other hand, a dry sidewalk may have many of the attributes of a desert. A concrete highway is an excellent desert educationally if the teacher has any imagination. The teacher should look about her for all sorts of little areas where there are little climates which illustrate what is going on over big areas elsewhere. These little climates which may be controlled should help us understand the big climates which may be beyond our control. When we plant a tree we provide an area in which there is likely to be reduced sunlight for a long time, and in the shadow of this one tree we may find things different from what is to be found where there is no shade. Mark Twain is reported to have bemoaned the fact that we could do nothing about the weather, but we surely can, in small areas.

And what goes for small areas of space also goes for small areas of time. Too frequently our school work deals with great units of time beyond the comprehension of the learner. With enough "little bricks" of conviction based on personal, local, and immediate experience, we can build the pyramids which represent conservation as a whole, as presented by Jay N. Darling in the foregoing chapter. Without these, we build only a dream house or nothing at all.

It is recommended that students begin work in conservation, learning how to use such simple tools as a thermometer, a level, a compass, and the simpler instruments for measuring conspicuous acidity and alkalinity.

If instruments are available for reading light intensity or humidity, they should be used. Once the simpler uses of these tools have been mastered, students should be urged to explore many places in nature with them as much as possible. A snow bank, a stone wall, a woodchuck hole, a decaying log, a watering trough, a fence post are but a few of many places worthy of investigation. Such directions as lead to finding the hottest, coldest, wettest, driest, most windy, most acid, and saltiest places should be given. They have much more educational value than reading about the circumpolar winds and the extinct dodo, and if the things which happen in such small local places thru a season or thru the seasons are understood, a fine basis for sound conservation has been laid.

The author has outlined in ten issues of the *Cornell Rural School Leaflet*¹ some of the essential problems of conservation in rural areas. Each of these 32-page bulletins develops a different angle of the conservation problem but together they provide a balanced whole. The titles may be suggestive of the contents. They are organized into three groups of three units each. The bulletins on wildlife conservation are *Farm Forest Facts*, *The Fields in Winter*, and *Waterways in Spring*. A second series deals with conservation of inorganic resources and includes numbers on *Holes in the Ground*, *More About Water*, and *U. S. Minerals and Us*. The remaining series deals with conservation of human resources. In this series are bulletins on *The Finer Side of Life*, *You, Let's Play Safe*, and *Outdoor Living*. These titles may be suggestive of units which might be developed in any conservation program. Certainly none of these should be omitted in a balanced program and there may be wide variation in the ways in which the units are developed.

Other programs have covered the same ground or have developed more extensively a few of these departments. Some have undertaken to prepare materials dealing with such units as birds, fish, mammals, soils, and the like. Others have provided rich material on the teaching technics thought best for making a program function. Still others have merely provided skeletal outlines of topics either organized or not. A summary of some of these programs was published in the November 1939 issue of *Nature Magazine*. In this same report is a rich summary of literature up to the time of publication.

WHAT CHILDREN CAN STUDY

Some suggestions for content and activities may be worth summarizing here.

Forest problems—Much of the professional leadership in conservation has been recruited from men trained in forestry. This training has sometimes biased them to see the forest primarily as a source of timber and pulp. One

¹ See Bibliography, p. 103, 110, 113

professional forester with many years of experience criticized severely a conservation program which gave reasonable consideration to the relationships between forests and deer, grouse, and fish. He had never thought of wildlife as being related to forest problems, and yet in a state like New York the value of deer raised in rural woodlot areas equals or barely exceeds the value of firewood harvested from farm woodlots. The value of the fur-bearers is also important. The Land Planning Committee of the United States National Research Board has set a value of fourteen cents per acre per year for the returns which may be expected in the form of flesh and fur from wildlife, and twenty-three cents per acre for the control these organisms have on agricultural pests. In the drier parts of the country, these figures are set at four and thirteen cents respectively.

Forest problems which may be studied in rural schools include some of the following: the abundance of wildlife in different parts of the forest such as in the depths and near the borders; the abundance of wildlife near different species of forest plants; the role of brush piles in providing protection for harried forms of wildlife, the seasonal blooming of flowers and the varying intensity in a wooded area of the sunlight which reaches the forest floor; the changes which take place on the forest floor in which leaves turn into humus as they become buried; the zonal distribution of life vertically from deep in the soil to high in the treetops, the role of dead trees in providing shelter and nesting sites for useful birds and fur-bearers, the fire hazards of forested lands located near highways and railways and the technics for controlling forest fires and avoiding their dangers; the practice of burning overforested land in the spring and the effect this has on maintaining a stand of young trees which will provide a sustained yield thruout the years; the effect of stands of forests on the clearness of streams that flow thru them, on the constancy of flow of these streams, on the life which may be found in these streams, and on the temperature of these streams, particularly during the warmer parts of the year; the value of woodland products in medicine and in the arts, and as food to supplement commercial sources and the species, such as poison ivy, which may affect health adversely, an understanding of the injury done to forest trees by mice, rabbits, deer, porcupines, fungi, and insects, as represented by collections made locally; and the value of forested lands as recreation centers for tourists and others.

Meadowland problems—Open lands such as meadows, prairies, and pastures are full of problems the solutions of which should be significant to those who will live in rural areas or be dependent on rural areas. Crop lands may well be considered with these lands.

In these areas, the surface is more likely to be disturbed by cultivation. This brings into consideration contour farming, strip cropping, crop rotation, dry farming; erosion of the sheet and gully types and their con-

tol, wind erosion and its control; and the study of water table, fire, insect scourges, and fungous injuries.

Aside from these more agricultural types of activity, there are the wildlife management technics. Among these are the role of fence rows in providing food and shelter for game species, the practice of leaving a row of grain for game species, the use of flushing bars on mowing equipment to save the lives of nesting birds, the establishment of shelters in fence rows, and the role of burrowers such as woodchucks in providing winter shelter for such game species as rabbits. Recognition of weed species that may be grown in waste areas and provide anchorage against wind and water erosion, and the role of these areas in providing food and shelter for small game species; the conflicts between game species and crops and predators and the recognition of the factors involved, the role of weeds in anchoring blowing snow and preventing moisture loss thereby; the economic importance of wild forms of the open which are and of those which are not direct competitors with farmers for the products of the land; the role of animals such as skunks in controlling insects, of some of the snakes, like the bull snakes, in controlling gophers, and even the role of coyotes in keeping down rodents which compete with the grazing animals for desirable food—all these are but a few of the many problems open to rural-school conservation education. An important demonstration of each will be found in some rural school by those with the wit and intelligence to see it. Each provides a more virile program of education than can commonly be found in the pages of any book.

In winter open fields in many parts of the country are covered with shifting snow. This melts more readily along the north side of east-west roads because of the southern exposure. Here, on a road, we have a little demonstration of the relative value of lands sloping to the south or to the north. Explore such a snowbank with a thermometer and great surprises are in store because there may be as much as forty degrees difference in an inch of snowbank. This brings up consideration of the problem of snow as a blanket for winter wheat, as a protection for mouse pests, as a source of building up the water table, and of similar interesting phenomena. The tracks of birds and mammals in the snow give relatively permanent records of animal activities and point out the importance of food species to different creatures. Incidentally, almost any weed top such as pigweed will be seen to yield enormous quantities of fruits in excess of those necessary to maintain the species in its normal abundance. The record is on the snow for those who wish to see it and shows clearly the surplus which is available for harvest in many kinds of living things. Much of wildlife management centers around the intelligent harvest of this surplus, tho the discussion about what is intelligent in this connection is not always rational.

Desert-lands and waste-lands—Some rural schools are located in the less fertile parts of the country. Even here, there are excellent opportunities for developing a sound conservation education. Such areas commonly are subject to abuse by overgrazing of cattle, goats, and sheep, and the injury these animals may cause not only by eating plants but by trampling them. Simple studies may be made as to why the locations under consideration are desert-like. This may involve simple studies in recognizing the presence of alkali, salt, and other chemicals which influence plant development, as well as the mechanical nature of the soil which separates the soil surface from a water supply too far down for ordinary plant use.

The water storage problems of plants are always worthy of study in desert and waste areas, and many of these are illustrated in the weed spurges which survive the difficult conditions to be found on many an ash pile or on violently abused bits of land, such as exist at home plate of the average baseball diamond. We can find deserts wherever we are if we wish to do so and the dime store will provide us with living cacti if we feel we must know these more characteristic desert plants.

Waterways—Whether a waterway is a simple roadside ditch, a spring, a sea coast, or a lake, it holds an interest for all of us and abounds in conservation problems suitable for use in a rural school. The problems will not all be the same but they should be sufficiently abundant to meet the needs of any school.

Waterways are capable of yielding more to man than they usually do. We have hardly begun to make the best use of many of the plants which grow in water whether the water is salt or fresh. Many rural people are victims of get-rich-quick schemes centering around the raising of frogs' legs for the market, the raising of turtles, bait minnows, muskrats, or game birds. Each of these offers possibilities but they call for intelligent, concerted effort, just as success in raising foxes for their fur is not found by all who begin such projects. In spite of this discouraging introduction, a waterway or pond on a farm, wisely managed and convenient to an appropriate market, should be made to yield as much or more than the drier lands which may border it. Goldfish, bait minnows, and aquarium fishes are individually valuable as are diamond-back terrapins, but each must be where it can readily be marketed without expensive delivery charges if an adequate reward is to be expected for the efforts its rearing demands.

The management of a brook so that it may be made to yield more trout may be observed by many rural schools. The essence of such management calls for the establishment of a year-round water temperature below that which is critical for the trout species involved. It calls for freedom from silting. It calls for a maximum of resting places, feeding places, safe retreats from danger, and food-rearing areas in a mile of stream. These areas are easily recognized and often may be developed with a minimum

of effort on the part of pupils who will play in such a waterway anyway. They will make dams, pools, channels, and bridges in a waterway, but usually this has no conservation significance to them. The play might easily be directed toward profitable ends. Similarly, marsh-lands are managed for the production of game birds and fur-bearers by creating a maximum of food and shelter for the species being encouraged. Unfortunately, what is food for a muskrat may not be suitable for a duck and vice versa, so it may be necessary to determine which species will give the greater return to the manager.

It is true that any study of waterways must consider the losses caused by floods, pollution, wave action, erosion of banks, streams, and the association of mosquito pests with areas which are superior breeding grounds for many waterfowl. These conflicts only provide a more interesting conservation lesson for the teacher and only point up the idea made earlier that what may be good conservation education and practice in one place may be otherwise elsewhere. The fact that the low-income group of any community near a waterway may get much of its living from waterways emphasizes that such areas should be maintained by a society to yield a maximum return and should be understood by all, particularly those who are most directly dependent on them. This should suggest an abundance of real problems to the alert conservation teacher in a rural school near a waterway. In New York State alone, it is estimated that about \$2,000,000 is involved annually in supplying the needs of sport fishermen, so the problem is not alone of interest to the low-income group.

Households and farm buildings—Not all wise conservation centers around the out-of-doors. Homes and barns provide an abundance of problems, some of which are suitable for solution by elementary-school children. A building which is not kept in repair or which is abused will not last so long as one on which reasonable effort is expended. A single shingle off the roof may ruin many rooms beneath. A drain from a roof may start a stream which may start a gully which may cut a farm in two if it is not wisely managed. A rat left to breed and multiply may destroy stored grain, clothing, food, and poultry and may ruin walls to such an extent that it nullifies any profit which might result from much labor in the fields. The adult or child who is qualified to meet these situations and change them to his own ends is practicing wise conservation, and consideration of these things should be a part of conservation education in a rural school. They are more real than what is happening to whales in the Antarctic, and the child can do something about these problems and get a return which he can see in a relatively short time.

Clothing and equipment left unprotected from the weather are often to be observed in rural areas. While it is not always practical to give farm machinery perfect care, nevertheless its life can be prolonged much by

good care. In times of war, when there is a great demand for metals and machines, it is essential that greater care of things made of strategic materials be employed. This extends to the proper treatment of garden tools and similar equipment whose storage and care should be considered in any well-planned conservation education program for a rural area.

Conservation of inorganic resources—Soil, water, and minerals other than water have been classified as inorganic resources. Much can be taught about their conservation.

As has been suggested earlier, the conservation of soil resources is of fundamental importance in any conservation education program. The Soil Conservation Service has published excellent bulletins which may be had from the national, regional, or local offices of that agency. However, there are a few observations and demonstrations which any rural teacher can and should make in connection with this study. Topsoil formation from subsoil is due primarily to the letting in of air, water, and organic materials thru holes made in the subsoil in various ways. The holes may be made by large or small animals, by plants, by weathering, and by other means. Children can make surveys of a few feet of soil in the schoolyard to see what holes are to be found there, how they are formed, and the effect these holes have on plant growth. The mounds made by earthworms are more or less conspicuous and the role these animals play in stirring the soil is worth investigating by the simplest of techniques. There is growing indication that these animals may be hosts to organisms which affect the health of larger animals and questions have been raised about the effect they have on the fertility of soil, but there can be no question that they do stir up the soil and this has some direct importance in soil development.

The erosion of soils is so ably covered in free literature generally available that it need not be considered here. As suggested earlier, children should recognize the types of erosion and the important methods of controlling erosion.

Water conservation is frequently a more immediate problem in rural than in urban areas. When water has to be pumped and hauled for stock and for human consumption and occasionally for plant use some of the labor is frequently delegated to the children. How that water may be put to its best use is effective education to Jack or Jill who may have carried it in a bucket up a hill but of little significance to Archibald and Gloria who get it from the faucet or from the icebox.

Some of the problems of water conservation which should be studied in rural schools center around means of purification of water by boiling or by adding iodine or other chemicals, means of preventing contamination of water at its source, and means of getting water efficiently from one place to another. The topics suggested in the study of waterways tie in with the

general study of water, and while it may be all right to study what the general science books tell us about water, there is much not found there which should be considered. The social science significance of water is important where it provides a medium for sports, such as boating, skating, swimming, and coasting, and in avoiding the dangers associated with such sports; where its contamination by factory wastes affects the lives and health of people; when the location of a well helps determine health, and where the silting of a lake or reservoir destroys the means of livelihood for a community.

The wise teacher will recognize the tendency of children to play in roadside ditches as providing an ideal approach for an understanding of wise use of water. Little dams, rapids, miniature lakes, and falls all offer primary lessons of importance. The ability of water to move silt, sand, and stones when flowing at different speeds is but one of the many problems worth thinking about.

We read much of the world's need for conservation of minerals but little about what can be done in rural areas to help in the situation. If we think of this problem chiefly as it affects metals, we can do much by teaching about the care of metal tools and roofs so that their usefulness may be prolonged. But possibly more important than this is to promote the realization by rural folk that anything they can do to make them independent of the overburdened transportation and industrial system of the country is really helping in the wise use of the minerals they have. A home garden that supplies food for the family relieves the railroads, trucks, and ships which might be needed to bring in other food which the garden supplants. Care of country roads by individuals who drain off standing pools of water or fill in ruts, which if neglected may become greater, are ways in which rural children may help keep the nation's transportation system in action and thereby lessen the strain on machines in national emergencies.

Any lesson on the saving of fuel is indirectly a lesson on the saving of a mineral resource. Children will engage in gathering junk to be turned over to the government to relieve the burden on raw and new minerals. Here are lessons not only in the natural sciences but in the social sciences as well.

ORGANIZATIONS IDENTIFIED WITH CONSERVATION EDUCATION

Many government agencies have identified themselves with conservation education. The National Park Service, the Soil Conservation Service, the Office of Education, the Fish and Wildlife Service, and the Civilian Conservation Corps are a few of these.² Communications addressed to these agencies will bring lists of their publications. State agencies such as con-

² For sources of complete lists and addresses, see page 114.

servation departments, agricultural colleges, and departments of education have done much in such states as California, Iowa, Michigan, Missouri, New York, Ohio, Tennessee, West Virginia, and Wisconsin. In Florida, Oklahoma, and Wisconsin, laws have been passed designed to encourage the teaching of conservation in the schools. In some states, such as Mississippi and Tennessee, well-organized extension activities have been supported with traveling demonstration trucks available for the leaders.

Established private groups have done much to encourage conservation education. The American Nature Association and the Pack Forestry Trust have sponsored graduate fellowships at Cornell University which have placed trained leaders in teacher education work from one end of the country to the other. The Audubon groups, the Isaac Walton League, the Wildlife Institute, the Wildlife Federation, and the Wildlife Society have sponsored educational work with varying effectiveness. The Wildlife Federation has had a series of education committees, one of which was responsible for raising a considerable sum of money and the publication of four small booklets designed for student use in the elementary grades. It has also engaged in selling stamps and in the celebration of Wildlife Week, which had some recognition. The Federation published in 1941 a book, *The Foundations of Conservation Education*, which represented the activities of one of the organization's committees.

A number of colleges have emphasized work in conservation but comparatively few have done much with conservation education.⁸ At Cornell University, a few candidates for master's degrees and about a half dozen candidates for the doctorate have made studies in this field based in part upon personal visitation to all parts of the country and some parts of Europe. These studies have examined the educational effectiveness of federal and national agencies, private agencies, state agencies, colleges, museums, field biological stations, and distinctive rural agencies, and of the efforts of writers of curriculum material for the elementary schools. The college of agriculture at Cornell has for nearly a half century published literature for use in rural schools and designed to help in the interpretation of the rural environment along the lines of good conservation. In recent years, some of this work has been closely integrated with efforts of *Nature Magazine* to perform a similar service in a broader geographical area. One example of this integration is found in *Guide to Science Teaching*, published by *Nature Magazine* in 1931; another, in the bulletin, *Conservation Education Problems in Schools*, published in 1938; and in another bulletin, *Conservation Education in the Schools*, published in 1939. These bulletins provide a survey of the types of offerings to be

⁸ See also Cook, Katherine M., and Reynolds, Horner I. *Opportunities for the Preparation of Teachers in Conservation Education*. Washington, D. C.: Government Printing Office. This bulletin lists conservation education courses in various institutions. The editor

found over a wide geographic area and over a long period of time. They give grade suggestions based upon a study of the then existing programs and alternative programs which may be appropriate for use in different places.

Various agencies are preparing new publications for release in the relatively near future, which will extend materials for study and which should appeal to the teacher and to the layman. As time goes on, this growing body of literature should help but not supplant the educational opportunities available to all who, like rural teachers, live and work where natural resources are being developed or exhausted. The responsibility for intelligent use of these resources rests in part on what the rural teacher does.

CHAPTER III

How Children Are Learning To Conserve

THIS CHAPTER contains examples of the work which children are doing as they learn to conserve various resources and become increasingly cognizant of the significance of simple conservation practices which they observe in their various communities. "Conservation thru the Year" deals with the conservation program of a one-room school for a year. Participation of all grades in a single project is marked. "We Help Our Community Conserve" places the emphasis on work which the children do at home as well as in school, and upon community cooperation. "A County Program in Soil Conservation" presents a county as an educational unit in a soil conservation region stressing the cooperation of county government agencies with the schools. "Young Southwestern Conservationists" consists of contributions from children and teachers in an entire conservation region, selected from school conservation programs inspired by regional government specialists. In the regional view which is presented the reader feels the authors' caution that children's ability to see the broad need for group action should not be limited by confining instruction to children's own conservation activities which, in the "light of mass misuse, exploitation, and lack of planning are inevitably slight." "Short Reports from Schools" contains suggestions for activities which can be adapted to many situations. Altho no state program is included, many of the schools represented drew on state sources for publications to use in their studies.

CONSERVATION THRU THE YEAR

Mrs Leone Davison

In our school most of the pupils are active young conservationists. We have projects connected with real conservation problems. We study conservation in connection with the regular school subjects, such as geography, history, and science or nature study. My pupils, especially the intermediate and advanced groups, have followed some of the literature on the subject, such as items in farm journals, state and federal bulletins, and bird and flower leaflets which we have arranged to receive from time to time. Most of our work grows out of the community and such of its needs and interests as can be related to the education of the children.

Our school is part of a good farming community in the upper valley of the Mississippi. Our land has low, rolling hills and produces fine crops of hay, wheat, soy beans, and corn, and furnishes rich meadows for dairy

cows and meat cattle. Our farmsteads, with their comfortable houses and large barns and yards, are for the most part attractive and interesting places for boys and girls to grow up and prepare themselves for their contribution in the world.

Some of the farmers are cooperating with the government in its program of soil conservation—they plan their crops wisely, replenish their soil, and refrain from overcropping. Others have been forced by the economic uncertainty of agriculture to get the most they can for the present, leaving the future to take care of itself, with little time or thought for better ways of farming. We have a farm bureau and a farm women's organization and are actively interested in the work of the Soil Conservation Service in our region. We have a farmers' cooperative creamery. There is a fine, independent community spirit in the things that really affect our lives, but little use for affectations and superficialities. Parents and neighbors cooperate wonderfully with the school.

Most of the children are familiar in a general way with the more spectacular conservation practices that are carried on in the home county, but they need to find meaning in these practices and in the care and use of the soil—practices which the parents have developed into a technic of farming. The children need also to see conservation problems from the state and national viewpoint. Those who are to become the nation's future farmers will have the real job of conserving agricultural resources. Those who cannot become farmers when they grow up need to learn the significance of conservation as a cooperative social problem in order that in other walks of life they may use their influence to help the nation conserve its natural resources.

With the opening of school last September the children and I had a great many ideas and plans for the year's work. Personally I hoped that we would stress conservation more than we had done, but I wanted the suggestion to come from the children. We try to practice democratic principles in our school. Consequently, our planning period took the form of a club meeting with temporary officers presiding. I was pleased when we were able to set up conservation as the major emphasis for our pupil activities. Each of the four groups in which our school is classified planned to talk with me and decide to what resources they would give their attention. I helped them plan topics that could be correlated well with our prescribed work and be really useful. The next morning the following choices were announced: Group A, soil and water; Group B, birds of prey; Group C, birds and game animals of Minnesota; and Group D, birds we see around us.

The children decided to call their school club then conservation club and to organize it permanently. We formulated a creed which reads as follows:

We believe that:

The term "conservation" should mean wise use of everything at all times. Conservation should be practiced now in hopes of leaving for others what was left for us

Materials necessary for our national defense should be conserved by everyone to protect everyone

Conservation should help us appreciate our great, wide, wonderful world

They adjourned this meeting with every member agreeing to submit at the next meeting suggestions for a name, a motto, and an emblem for the club and a plan of progress. The name finally chosen was WWTC, We Want To Conserve, the motto, No waste, no want. The emblem consisted of the letters WWTC in red on a blue triangle which in turn was placed on a larger triangle of white. For a club song, the children were unable to decide among three original ones submitted, and so used all three. It was planned to answer roll call by an item of information or a local news item on the topic chosen by the group for conservation study. Arrangements were made for a conservation bulletin board for clippings and local news. A club chart bears the letters WWTC and all the children's names, and underneath each name the conservation activities in which he has had part are written. It was arranged for a conservation specialist to speak at every third meeting. We had talks by a minister, the game warden, and a field woman from the AAA. The field woman showed us movies—"The River" and "The Heritage We Guard." One of the earlier settlers of the community talked about life in our district sixty-one years ago, when there were acres of unplowed prairie, much timber along the rivers, and timber wolves, prairie chickens, quail, and other wildlife. He explained how the country was gradually taken up by farms, the fields plowed, and many of the natural shelters for birds and wildlife necessarily destroyed with little or no provision for protection to take the place of the natural shelter and habitats.

We were fortunate in having our school chosen as a meeting place for members of the Regional Soil Conservation Service. There were three soil specialists and the county superintendent. They visited the school twice during the year and helped us with some of our problems and projects. Their interest encouraged the children. Each of these visitors was made an honorary member in the school club.

Now I will tell you how we conserved and what we learned. I will begin with Group D, the primary pupils. We did not begin with birds as planned because before we had started the conservation study someone gave the children a canful of tadpoles. We put these into an aquarium and kept them on our science table. We studied tadpoles, frogs, and toads. The pupils were surprised to learn what a lot of mosquitoes, flies, spiders, and various other insects a frog or toad will eat.

With the approach of cooler days, a group of blackbirds gathered in our big poplar tree preparatory to migrating, and our anticipated bird study was launched. We studied birds that migrate from our community, not too thoroly, but just enough to satisfy the children's interest, because I wanted them to take up the study of these birds again in the spring when children usually had them with such unbounded enthusiasm and enjoyment.

Then we studied our winter birds—those that do not migrate. Since three of the four groups had selected some phase of bird life for study, all the children worked together on many phases of the study of birds. We made ourselves an outline and studied the birds which the children saw—the cardinal, junco, pheasant, chickadee. The outline helped us organize the facts we learned about means of identification, such as size, color, song, and habits; about nest and eggs and food; and about migration. When the children came to food, no outline could contain or express their enthusiasm. Country children are not unused to being kind to the birds in a casual sort of way, but these children were amazed to learn the benefits we derive from birds. For example, they read that the blackbird, in spite of his reputation for taking grain, pays for this grain many times over thru the insects he eats. The chickadee with his sharp beak gets insect eggs from under the broken bark of twigs—several hundred a day.

"The birds must have a hard time in the winter to find all the food they need," said the children. "Maybe we can help them." They talked about putting out food and building shelters. "Perhaps the birds will get tame then and we can observe them better," said someone hopefully, but it was not "tameness" but security and food that gave us our chances to observe.

In the southwest corner of our schoolyard were three nice trees. This spot was selected as a bird sanctuary. The older boys built a picket fence of laths. It was painted white with red tips and used to enclose our bird corner. In one end of the enclosure a "two-by-four" was driven into the ground and on it was nailed a board large enough to support a pan for a bird bath. In the opposite corner was placed a similar arrangement with a feeding table and tray. Two or three birdhouses were built and hidden away snugly among the branches to await the coming of spring.

When winter came and brought some of our feathered friends for food and water we became more and more interested. "We ought to build a shelter," said someone, and away went several boys for cornstalks. Around a framework of wire netting they placed the stalks and some evergreen branches in tepee fashion, leaving an opening facing southeast. I had warned the children that if they began to feed the birds they would need to keep it up all winter, for birds once made dependent cannot fend for themselves, but the pupils scarcely needed the caution, so conscientious

were they in placing corn, suet, and seeds out for the birds. We hope the birds will remember our hospitality and return to us next fall!

Now as I write, in May, the debris has been cleared away and our sanctuary has been transformed from a home for pheasants, cardinals, chickadees, and juncos to one for robins, flickers, blackbirds, and meadow larks that visit us at a time when extra food is not so desirable as places for nests and materials with which to build them. A pair of meadow larks already have a nest in our schoolyard. We are keeping a bird calendar and a diary of our observations.

Among the flowers which the children planted this spring, such as petunias, zinnias, and four-o'clocks, are also sunflowers. Why? Because sunflowers, as well as being beautiful, furnish plenty of bird seed for winter.

The work of Group C on birds was to learn about Minnesota's state bird, the goldfinch, and others of that family. The children reported their study and observations to the rest of the school and made charts for the bird scrapbook and kept a calendar. On their own special topic, the big game of Minnesota, they studied bear, deer, mouse, elk, and caribou. Before the year was over, all the class had seen these, either in a park, zoo, or museum. The children also studied the beaver, skunk, and gopher. A movie was made of freehand drawings, contrasting the abundance of wildlife when forests were plentiful with its scarcity after the trees were cut. The pupils learned about game laws and the reasons why these are needed, discussed revisions needed, and reported their findings to the pupils in other groups.

Group B was interested in the bald eagle, our national bird. There are a few bald eagles in Minnesota. A pair can be seen nesting near the Mississippi River not far from Lake City. The children have seen them. We gathered information about eagles and learned that these birds are maligned for more harm than they do—that eagles do not, for example, carry off calves and children, as the old saying goes. The children also studied about owls and hawks (we have the sparrow hawk, the red tail, red shouldered, and cooper's hawk), and learned that while the farmer often considers these birds as enemies, they really are his friends because they eat mice and other small, harmful animals and more than earn their keep.

The pupils in Group A helped when needed in the other groups' studies of birds. They spent most of their time on their special assignment, tho, which was the conservation of soil and water. They planned what they considered the ideal program for building up wornout soil and for reducing erosion, leaching, and overcropping in the community. Learning that our county has two soil conservation districts, the children found out how these are organized and what the program of each is, both with

respect to conservation of soil and improved use of the land, and also with respect to protection of birds and wild animals. They studied and mapped the district in which our school is located and planned all the conserving and soil-building practices that could be used for it. Saturday field trips by individuals and interviews with some of the district conservation officers were a help

The whole community has shared our study. Everyone who visits is interested in our bird sanctuary. Many passersby, curious to know more about it, stop during recess periods and talk to the pupils. The messages carried to the community by the pupils are far-reaching. One boy told his minister about our study of hawks, and we feel that we have the church as well as the homes with us. One should really see the children at work to appreciate their zeal fully. "Mrs. Davison, birds are my *particularity*," said one of my first graders. The others shared her enthusiasm.

In carrying their study of conservation thru the year the children gained an idea of the scope of the problem. In studying the birds, wild animals, and soil in their own community they learned that the way in which other communities and other states protect their natural resources affects us. For example, migratory birds that are protected in Minnesota may be shot in other states, if those states have no laws to protect them. Unprotected watersheds in one state may increase the waters that cause floods in another state. A stream that has a dam near its source in a neighbor's field is easier to control in one's own pasture. Hence there is the necessity for states and neighbors to cooperate in protecting the natural resources. There are similar needs for cooperation among different countries, but our study has not yet been carried so far.

WE HELP OUR COMMUNITY CONSERVE

Charles F. Martin

One- and two-room schools of Jackson County, Iowa, for five years have made conservation of the natural resources of the community a part of their annual program. This article discusses the conservation of wildlife in the county.

Jackson County is located in central eastern Iowa adjacent to the Mississippi River. It is a typical river county, traversed by the Maquoketa River and its tributary streams. Limestone cliffs border the valleys. The topography is quite hilly and rough.

Much of the county is better suited for grazing than for crop farming. In spite of the rough land considerable corn is raised and fed to livestock. Corn and small grain acreage is significant in the planning and consideration of this project because the waste grain provides a natural source of feed for wild birds and animals.

Hardwood timber, some virgin and some second growth, is occasionally found adjoining the valleys, particularly in those areas not suited to cultivation. Much of the gully and ravine areas are covered with native shrubs, vines, small trees, and undergrowth. Yet in other areas natural cover (vegetation) is almost wholly lacking because of the unrestrained removal of timber, overgrazing, and the farming of land wholly unsuited for cultivation.

The county, like most Iowa counties, is typically rural. The two largest towns have populations of 4076 and 1771. Dairying and the raising of livestock is the chief business of farmers. Merchants in urban centers depend largely upon farmers for trade. The county has few other industries.

Need for the Project

Conservation of wildlife was selected as a school and community project because of certain educational, social, and economic needs of the community and from the knowledge that the activity which ties itself closely to the natural interests of a community will get the desired educational results better and in less time than one which, more or less, needs artificial stimulation.

There are other reasons for incorporating the conservation of wildlife in school procedures. It builds wholesome interrelations between school and community. Pupils make their activities practical by working in the community, and the patrons make their homes helpful to the school by cooperating with the school program. Patrons and pupils alike develop desirable traits, habits, and attitudes not only in dealing with conservation but also in the whole school-community relationship.

Helping children understand and practice conservation is a direct approach to the primary aim of conservation, which is to re-establish in the minds of men the desire to carry out those practices of planning and planting which will permit nature to re-establish and maintain natural habitats and natural sources of food for wildlife to the extent possible in maintaining high standards for human life. Barren hills, marred with ugly, eroding gullies, are grim reminders that men have had desires to the contrary too long.

Activities

During the development of the project on conservation of wildlife, the following types of planting and control were discussed with the farmers as suggestive of practices that might be utilized in developing farms for wildlife and in conserving the soil. In this way valuable firsthand information was secured for the project and new ideas were disseminated in the community.

1. Fence row plantings as travel lanes (cover)
2. Fence corners (cover)
3. Gullies (cover)
4. Borders of field plantings (nesting and travel cover)
5. Borders of existing timber areas (cover)
6. Grass waterways (nesting and travel cover)
7. Odd corners cut off by gullies (food and cover)
8. So called waste areas (food, cover, and woodlots)
9. Grass field margins for turn rows (nesting and travel cover)
10. Pond borders and the pond itself (food and cover)
11. A back swath of grain, small patch of standing corn near wildlife cover, or a few shocks of corn in a protected area to furnish food for useful wildlife (food)
12. Protection of slough grass and marshy vegetation from burning and from grazing when practical to do so (cover)
13. Protection of existing woody and brushy cover
14. Arrangements for a dependable year-round food supply, as well as winter cover
15. Distribution of information to discourage burning and encourage protection
16. Food patches

Many community resources were utilized. Patches of undergrowth, uncut fence rows, and other uncultivated tracts adjacent to the schoolyard provide a laboratory unique in the science of education—a laboratory where children can study conservation directly thru firsthand experiences which teem with interest and excitement. In this natural laboratory, children place many of the constructed forms, such as shelters and feeders made by their own hands, as an essential part of the project. In making these forms, the child feels he is rendering a service to the general well-being, a basic principle in this project on conservation. There is no make-believe or imaginary experience. Experiences are real—a part of the community life in which the children are living, and essential to the solution of the important problem at hand.

The project has served as a motive for much of the customary school work. As a stimulant to natural science, it is a "natural." One who has experienced the thrill of flushing a pheasant or a covey of quail will readily understand the eagerness of the child to write or tell about similar experiences received in developing the project. Or consider the group of pupils who have had a covey of quail or a flock of pheasants released near their home or school and have been charged with the responsibility of bringing them thru the lean, cold months of winter by placing a sufficient quantity of the right kind of food in a shelter which the pupils themselves constructed. How anxious the girls and boys are to tell about their experiences! The topics for oral and written composition become vital and interesting.

With the problem of feeding come the questions of kinds of feed, food elements, balanced diets, weighing and measuring, a study of the weather, natural sources of feed and how to provide them, and many related problems all of which give the pupils a real use for arithmetic, agriculture, and reading, with the other subjects doing their part.

Results

The number of one- and two-room rural schools taking part in this activity during the past five years has varied from 117 to 121 each year. Each year 100 percent of the rural schools participated. The degree of participation of individual schools varied considerably and was dependent largely upon two factors—the natural environment and teacher interest. The latter factor was generally the determining factor because adjusting the environment is one of the objectives or aims of the project.

The following figures indicate a more or less accurate statistical summary for one year, and will give some concept of the extent of the conservation project from the standpoint of conserving wildlife.

STATISTICAL SUMMARY—1941

Wild game bird and animal stations		Songbird feeders	
Maintained by school	135	Maintained by school	120
Maintained by homes or individual	131	Maintained by home	111
Total	266	Total	231
Kinds of wildlife fed		Amount of feed provided	
Pheasant	1,245	By individuals	5,306 lbs.
Quail	2,677	By agencies	2,237 lbs.
Squirrels	635		
Rabbits	1,785		
Songbirds	4,188		
Miscellaneous	1,160		
Number of trees planted for woodlots, erosion control, game cover, and water conservation			13,000
Number of conservation packets planted			15
(Packet consists of trees, plants, and shrubs totaling 250 plants—sufficient to plant one-fourth acre)			
Number of natural feed-lot plantings of hegari			12

While the above summary indicates quite definitely and specifically community participation in this type of school program by showing the number of feeders and stations maintained at home, number of trees and conservation packets planted, and the number of feed-lot plantings of hegari, it does not indicate some of the more significant and far-reaching results. The social development of the child, experience in real citizenship,

better school work resulting from the stimulation that comes with the correlation of conservation with the common branches, and a more thorough understanding of the economical and vocational significance of conservation in relationship to agriculture are some of the more basic outcomes.

With participation in this project comes a greater appreciation of the out of doors and the wholesome recreation it affords. The child becomes sensitive to beauty. "Where can people better develop a love of beauty than in seeing the beauty of a tree, whether dressed in green, crowned with gold, tufted with snow, or silhouetted as dark lines against the sky? What joy there is in observing the grace of movement of wildlife, the blended colors of plumage and plant life, or the wide productive vistas of plains untouched by erosion."¹

During the past five years in which conservation has been a part of the school program in Jackson County, we have found that by participating in it, children developed wholesome interests not only in school life but also in one of the fundamental economic problems of the farmer—the problem of conservation. Boys and girls had their first lessons in cooperating with the folks outside the school for the common good. They learned better how to work with the group in school in solving a problem. They became familiar with an activity that provides recreation of the most wholesome type. They learned more about nature's creatures and developed a keen concern about their welfare, becoming conservation conscious. They came to appreciate more some of the values of rural life and the social and economic advantages of farming.

APPRECIATED OUTLET FOR THE PROJECT²

I. Approach

- A. Children often see flocks of birds gathering in preparation for their flight south, also flocks already on their way to warmer localities. The groups may discuss their observations, raise questions, write for bulletins, and study migration of birds.
- B. Old birds' nests often come to view when the leaves fall from the trees. Discussion may bring out why these homes are no longer used.
- C. The children may see the squirrels, common in many localities, carrying or hiding nuts. This suggests their making provision for winter food.
- D. Many times children see wildlife, such as pheasants, quails, and other kind, along the highways and tell of these experiences in school. Questions concerning their winter food supply may be asked.

Note: Vocabulary to be developed is needed.

¹Page 11, *Unit A*, and *Master Guide I: Conservation and the School*, Mason City, Iowa, Lakeside Press, Inc., 1931. The publication contains additional suggestions for *grades*, *methods*, *correlation*, *conservation* with the *main* school subjects.

²Page 11.

- II Development of the study (a guide for developing conservation of wild-life)
 - A Realization of animals' living problems at each season of the year
 - 1 Among birds
 - a Migrating
 - b. Nonmigrating
 - 2 Among mammals
 - a Those that hibernate
 - b Those that store food
 - c Those that neither hibernate nor store food
 - B Provision for protection and care of wild mammals, game birds, and songbirds
 - 1 Taking a census
 - 2 Constructing feeders
 - a. For songbirds
 - b For wild mammals and game birds
 - 3 Studying the environment
 - a For wildlife habitats
 - b For natural supply of food
 - 4 Selecting a location and constructing a station for shelter and feeding
 - 5 Ascertaining sources of food supply
 - a Natural foods
 - (1) Wild
 - (2) Planted
 - b Governmental agencies
 - c Lay conservation organizations
 - d Private citizens
 - e Pupils
 - 6 Planting for cover and natural food supply
 - 7 Planting foundation stock of wildlife
 - a Sources
 - b Kinds
 - c Number
 - d Place of release
 - 8 Utilizing surplus stock—open season
 - 9 Keeping records of activities
 - a Number of stations maintained
 - (1) By the school
 - (2) By individuals and homes in the community
 - b Number of wildlife fed
 - c Amount of feed consumed
 - d Number and kinds of dead wildlife found and reported
 - e Plantings
 - (1) Trees
 - (a) Kinds and number
 - (b) Places and purposes
 - (2) Cover

- (3) Feed lots
 - (4) Results
 - f Planting of foundation stock
 - (1) Sources
 - (2) Kinds and number
 - (3) Places of release
 - (4) Results
- III Suggested activities involving conservation experiences
 - A Activities for creating and constructing
 - 1 Making forms with materials
 - 2 Making pictures
 - 3 Making stories, verse, plays
 - 4 Dramatizing
 - B Activities for developing attitudes of service
 - 1 Inspecting regularly shelters and feeders
 - 2 Reporting on observations at feeding stations
 - 3 Removing snow
 - 4 Making needed repairs
 - 5 Keeping predators from station
 - 6 Providing feed when needed in the feeder
 - 7 Finding additional supplies of food
 - 8 Assisting with the planting of cover, woodlots, and feed patches
 - 9 Attending new plantings of cover, woodlots, and feed lots
 - 10 Participating in summer management of game birds
 - 11 Giving attention and care to foundation stock
 - C Activities for investigating
 - 1. Observing
 - 2 Taking excursions and trips
 - 3 Asking people
 - 4 Looking at pictures
 - 5 Listening to the radio
 - 6. Reading
 - D Activities for appreciating
 - 1 Caring for wildlife
 - 2 Observing wildlife
 - 3 Listening to wildlife
 - 4 Listening to and reading stories and poems
 - 5. Listening to music, and singing
 - 6 Enjoying pictures
 - E Activities for developing abilities in the skill subjects
 - F Activities correlating with content subjects, especially those for developing desirable social attitudes
 - G Activities for culminating the project
 - 1 Writing accounts
 - 2. Giving assembly and community programs
 - 3. Making reports
 - 4. Making and showing movies
 - 5 Exhibiting and explaining projects to visitors

IV Anticipated results

A. Results in the community

- 1 Increased wildlife in a locality
- 2 Increased number of areas planted for cover and woodlots
- 3 Conservation of soil due to plantings
- 4 Improved appearance of landscape due to plantings
- 5 Better crops because of fewer insects
- 6 Cooperation between community and school in the undertaking
- 7 Belief in the value of conservation of wildlife established in the community
- 8 Cultural aspects of rural life enhanced
- 9 Spread of the conservation idea to other localities by those who have used this project

B Results in terms of pupil development

- 1 Correct attitude toward conservation
- 2 Knowledge of some good conservation practices
- 3 Ability to carry out such practices
- 4 Knowledge of natural environment
- 5 Enjoyment of an enriched school program
- 6 Skill in using an enlarged and enriched vocabulary
- 7 Skill in attacking problems
- 8 Skill in use of materials to answer needs
- 9 Acquisition of esthetic tastes
- 10 Acquisition of interests which will lead to wholesome recreation thruout life
11. Increased desire on the part of worthwhile youth to "stay on the farm" because the lure of city life is overshadowed by the attractiveness of richer and more interesting rural life

A COUNTY PROGRAM IN SOIL CONSERVATION

Edna Barnes

Adair County, Iowa, lies in the heart of the upper Mississippi conservation region. Conservation problems of the upper Mississippi conservation region, like those of other regions, vary with the geographical characteristics of communities and with economic pressure and farming practices. In most communities the soil needs some conserving. In many communities the soil is being almost irreparably abused. In many, there is need for the conservation of water. Both soil and water conditions determine the policies followed in regard to the use of the soil. Most of the states need to do much in connection with the conservation of wildlife and fish. Forest regions are still being seriously damaged, especially by fire. Strip mining does irremediable damage to good soil in certain districts. Flowers that once decorated the prairies are almost gone, because the prairies have had to be plowed to feed the United States and much of the rest of the world. Birds, like the flowers, have lost their habitats and many

are gone, yet some have been less troubled by the encroachments of civilization than others and perhaps can be kept

In the schools, the children who come from farms and villages are in close contact with the natural resources and the work of the farm. They readily see the reasons for conservation and are interested in studying the subject and in undertaking conservation projects adapted to the needs of their various communities when the school program permits.

In Adair County, for example, a community of general farms, the program of conservation in the schools is based on the problems that have connection with the use and needs of the land and on the development of conservation agencies in the county. The county lies chiefly in the southern pasture area of the state, altho cash grain crops are grown and many hogs and cattle are fattened, and these provide a large part of the farmer's income. Except in unusually dry years, Adair County has annual rainfall sufficient for good crops. The average is 33.04 inches. The average snowfall is 29 inches. The water table is lower than in former years, however, and many farmers need to conserve water for stock. The growing season is about 165 days. The largest village is Greenfield, which has a population of 1800, made up largely of retired farmers, local business and professional people, and people in service occupations such as filling stations, garages, and cleaning establishments.

In Adair County there has been serious need for the conservation of the soil for some time. In 1921 the U. S. Department of Agriculture, cooperating with Iowa State College, made a soil survey which is the first accurate record of soil resources of the county. This survey showed that the erosion that has taken place is due almost entirely to the action of water. Very little wind erosion has occurred.

In 1933 the extension division of Iowa State College made an erosion survey of the state of Iowa as a whole. As nearly as can be estimated from this and other surveys, the erosion conditions of Adair County are as follows:

Seventy-five percent of the upland has lost half or more of its topsoil. About 18 percent has lost between one-fourth and one-half of its topsoil. About 7 percent has lost one-fourth or less.

Altho experimenters are said to be able to produce fertile soil today out of sterile soil far more quickly than nature made her topsoil, most farmers who want to save their land still consider it a good idea to stop soil loss by means of improved methods of farming. Since its organization in 1917, the Farm Bureau of the county has been carrying on educational meetings and demonstrations on methods of erosion control. Thru experimenting on fields, the fertility needs of the soil were studied. Thru the influence of the Farm Bureau and the Greenfield Service Club, the Grand River watershed was set aside in 1935 for demonstrating methods of soil and

water conservation. About 115 farms cooperated in the work. During 1939 a newly organized county planning board recommended that conservation activities be spread thruout the county and much has since been done. The same year the county board of supervisors put the Iowa Limestone Act in force in the county, making limestone less costly to the farmers.

The interest developed by the various organizations interested in soil conservation resulted in the formation of the Adair County Soil Conservation District in 1940, with a program of help for farmers desiring to improve the fertility of the soil and control erosion on their farms. Among the agencies at work on the program are the Soil Conservation Service, Agricultural Adjustment Administration; Farm Security Administration; Iowa State College Extension Service, and Farm Bureau, including Adair County Planning Board, 4-H Clubs, Woman's Home Project Groups, and other groups under the supervision of the county agent and the county home demonstration agent; and high schools offering courses in Smith-Hughes vocational agriculture.

This home and community interest in conservation and the various agencies at work constitute sources on which schools can draw for information, stimulation, and assistance. Teachers and children look for erosion on their school grounds and in their communities and discuss the means of controlling it. Some have beautified the grounds by planting trees and flowers. Others have secured the help of schoolboards and neighbors in keeping the yards mowed and attractive thru spring, summer, and fall. Some children, becoming interested thru the school or 4-H Clubs, have made their home yards attractive by collecting trash and planting flowers and grass and caring for these. Many have observed the wild flowers that still remain and discussed the possibility of preserving some places for them to grow, and have planned food and shelter now and then for birds.

The past year special emphasis has been placed on conservation of the soil thru cooperation with the Soil Conservation Service and in connection with the Adair County Soil Conservation District's program. The purpose of the cooperative efforts was twofold: (1) to spread the gospel of conservation thru the children to the parents, and (2) to help the children grow into citizens with the understanding and knowledge needed to care for the nation's soil or to vote wisely in regard to it.

Suggestions for a study of conservation were prepared by the county superintendent, based on the soil needs of Adair County and on the books and bulletins which the schools had or could secure. These suggestions were mimeographed and given to those teachers who expressed an interest in the work.

Activities and observations were begun with the resources close at hand. In a number of schools the initial activities were extended. Some

grew into comprehensive studies of the subject, usually with the emphasis on the conservation of the soil rather than other resources. Exploratory activities included:

Trips into pastures near the schoolhouse to study erosion and discuss means of control

Excursions by the school or by individuals on Saturdays to observe needs for conservation and ways in which the soil is being protected, such as contour plowing and planting, terracing, planting trees for windbreaks, strip cropping, check dams, planting of trees and shrubs

Studies of soil building in the school district, such as the spreading of fertilizer, plowing under of crops and stubble, the planting of legumes, experimentation on the school ground or at home.

Studies of the effects of tenant farming on soil in the county as suggested in "Iowa, People, Resources, and Industries of the Hawkeye State"

Making of maps to show the natural and artificial drainage of Adair County

Consultation with parents or neighbors who have a part in the demonstration methods of the Grand River watershed or independently engage in conservation practices

Study of contour farming in the county, including list of names by districts of more than three hundred farmers who planted all or a part of their crops on the contour in 1941.

Experiments showing growth of plants in different kinds of soil

Collection of government bulletins and other materials on conservation

Conservation club.

Among the questions raised and the problems formulated for study in different schools were:

How much soil has our county lost? (After study one class made a graph to show the varying degrees of estimated soil loss in different parts of the county)

Is the liming of field crops in Adair County worth the cost and trouble?

How was the soil of our county made? (Geological story) How kept fertile?

Have the conservation methods of the Grand River Watershed carried on since 1935 been successful? (Interviews with farmers)

What has the Soil Conservation Service done to help conserve the soil in other parts of the United States? Are the problems of other states like ours?

What conservation practices have been successful in Adair County? What ones have been unsuccessful so far? Why?

What kinds of erosion have done most damage in Adair County?

What are the conservation problems of other parts of the United States? Of other countries? How are these being handled?

Thru field trips, interviews with parents, experiments, and reading, the children and teachers gathered the facts they needed to help them with their questions and problems. Some of these were studied by individuals,

others by committees or classes. In most schools there were many discussions and much pooling of information. Useful books and bulletins were collected.

In making records and reports of their studies the children collected pictures, gathered soil specimens, made graphs and maps, drew cartoons and planned posters, made scrapbooks, and wrote accounts of their study and observation. Among the items prepared were:

Maps showing conservation projects in Adair County.

Posters showing how Adair County farmers conserve soil for defense

Collection of pictures showing types of soil conservation practiced in Adair County

Collection of small pictures arranged in opposite parallel columns to show (a) where soil is wasted and (b) where soil is conserved

Map showing position of Adair County among the areas of land use in Iowa (dairy area, cash-grain area, western meat area, southern pasture area, eastern meat area)

Eighth-grade class books on the conservation work of the school, including articles and themes about Adair County's conservation needs, original slogans, maps and graphs, pictures and clippings, accounts of experiments, stories of the nature and formation of Iowa soil, and a list of books and bulletins used

A collection of the children's work, chiefly the records of their activities mentioned above, was displayed, first in Greenfield, in the window of the Soil Conservation office, and later in other towns of the county. It drew the attention of parents to their children's work and to the problems of conservation in the county, and was a source of interest to children.

Several scrapbooks in the display showed understanding of the county's problems. One which received especial attention was "The Study of Conservation" by the pupils of Grades IV to VIII in a one-room school, Jefferson Township Number 2. It included articles, maps, and pictures related to the problems of the home district and was initiated by a field trip, described by one of the pupils as follows:

Our Field Trip

Friday our school went on a field trip for our Iowa Club program. We went to LeRoy Fritz's farm about a half mile north of the schoolhouse.

We went to see how a contour farmer plows his ground. Mr. Fritz showed us the way the rows went. He contoured because the other way the water would wash the soil. He had a small ditch in the middle of the field about eight years ago. He contoured and now it is almost level. It was a very interesting trip.—Anne Lillie, Grade 6.

There is a sketch of the LeRoy Fritz farm of 160 acres, made by Rosalie Fritz, fifth grade, followed by a plan showing a three-year rotation for corn, oats, and clover by Gene Boss in the eighth grade. A discussion of

the use of lime ordered from the county agricultural office, a pictorial study of terraces, an article on the use of fertilizers, and maps showing various types of soil are some of the other contributions.

In extending the program next year, it is planned to encourage more and more the participation of students in the actual work of conservation. There is work that many can do in making known the results of conservation projects, in developing bird and flower sanctuaries, in planting trees, in gardening and the wise use of soil in connection therewith, in helping to landscape home farmsteads, in the improvement of livestock and poultry, cooperating with 4-H Clubs, and in the more efficient use of materials and of foods³

YOUNG SOUTHWESTERN CONSERVATIONISTS

Julia B. Tappan and Anne Raymond

Our Country and Our People

The Southwest in this account¹ includes the intermountain region west of the Rockies—the states of Arizona, western Colorado, New Mexico, and Utah.

The Southwest is an old country—old in its mountains, old in its great rivers and canyons, old in its dinosaur tracks and bones, old in its prehistoric signs of man, old in its practically continuous habitation by Indians, old in its European “discovery.” Here dates begin in 1529 with Nuño de Gusman and continue in later years to Coronado and Spanish conquistadors, Franciscan friars, trappers, traders, the Santa Fe Trail, Mormon pioneers, sheep and cattle kings, miners, and health seekers of today. Over these, our youngest states, have flown the Spanish flag, the Mexican flag, the flag of the United States.

Water has been and is the measure of survival or failure—water which for the most part has its source in the high elevations, water long ago led off in irrigation ditches by Indians, water today stored in gigantic reservoirs, still led off in ditches to irrigate land and grow crops.

There are great stretches of semiarid country—sparsely covered with grass, sage, mesquite, where the pine of the open country, the piñon, is

³For getting the conservation program started in the schools and for encouragement and help, credit is due the following persons: Carl R. Fritzche, soil conservationist, who helped with initial planning, J. Ross Oliver, soil conservationist, who read the manuscript of the foregoing article and checked its technical accuracy, John Dooley, county agent, and Charles Jackson, chairman of the Agricultural Adjustment Administration for Adair County.

⁴The following schools have contributed to the account: the schools of Washington, Panguitch, and Garfield Counties, Utah, La Plata, Mesa, and Delta Counties, Colorado; Sandoval and Bernalillo Counties, New Mexico; John Marshall School, Albuquerque, New Mexico; The Nambé School, Santa Fe County, New Mexico; Menlo Park School, Tucson, Arizona; Safford School, Safford, Arizona; and the elementary schools of the following teachers colleges: Gunnison and Fort Lewis, Colorado, and Tempe, Arizona.



Courtesy Santa Cruz School, New Mexico

*We Are Tying
To Control a Gully*

still growing in its three hundredth year; a country of contrast in elevation, contrast in vegetation, contrast in climate, and contrast in peoples and cultures

The Southwest is a land where the delicate balance of water, soil, vegetation, and climate requires understanding; a land where teamwork is necessary for survival, for no individual can control or develop his own resources alone; a land where severe pressure has been and is being placed on its resources—increasing population, lack of outside labor markets, depletion of natural resources

All children of this land, in city or country, are aware of their surroundings. Towering peaks are not far from the cities; bridges cross great sandy river beds which ever so often become boiling, muddy rivers, irrigation ditches are familiar to all, torrential downpours are rare but too fierce to ignore.

The struggle for survival, the dependence on sun and rain, cold and heat, good grass or no grass, and water, is not far from the consciousness of everyone. Conservation of human life, conservation of our resources for livelihood is a natural part of education.

Below is a description of a watershed by seventh- and eighth-grade children. The place names are reminders of Spanish occupation

The Sangre de Cristo Mountains are east of Nambe, our community. The communities located in the valleys below these mountains get their water supply from this watershed. The water from the rains and snows seeps into the forest floor and into the underground reservoirs. The water that does not infiltrate into the soil goes into the mountain streams. These underground reservoirs are the sources of drinking water for all the communities in these valleys. People who do not have wells get their water from rivers which have their sources in the Sangre de Cristo Mountains, too.

The people in these communities depend on the water from the upper watershed for irrigation. All the farms in Nambe, Pojoaque, El Rancho, and San Ildefonso are irrigated by the waters of the Nambe River. The farms in Chimayo and Santa Cruz are irrigated by the waters from the Santa Cruz Dam. These waters come from streams in the Sangre de Cristo Mountains. The people in these valleys depend on the water of these mountains for a living.

All these rivers flow through these communities and finally reach the Rio Grande which carries its waters southward to the Gulf of Mexico.

There is a large industrial farming district in the Southwest but many of the people farm and ranch for their own needs, selling or bartering some crops for other produce. The land supplies them with their food, their houses and fuel, and some of their clothes. The following reports from rural pupils illustrate the use of home experiences in the instructional program of the school.

Alfonso's Farm

Alfonso goes to school in San Antonito. He is in the fifth grade. He has a mother and father. He has two sisters and two brothers that go to school. Their grandfather and grandmother live about a mile and a half from them. They have a farm over there. Over at the farm they have 65 acres of land. Alfonso's father has two acres of land here. He plants corn and peas. His grandfather plants beans, corn and peas. He plants wheat and cane too. They give the horses corn and cane. He also plants vegetables. They get the water from Mr. Reeves, its near Alfonso's house. He has three horses, a cow and a calf.

To the Mountains

Many of our fathers go to the mountains for wood in a wagon. The boys go with their fathers to help them. When father is going for wood he gets up early in the morning. He goes to the barn and gives the horses a good breakfast. Then he can bring a very big load of wood. After father eats his breakfast he starts on his trip. Mother always fixes a nice lunch for father because he will be gone all day.

The Story of the Oven

The oven is made of rock and mud. It is used to make bread. The oven is near my house. I sit down on a rock and put my hands into the oven.

The Well

We took a picture near the well. I was standing near it. The water was very clean. People drink from that well and also wash the clothes with its water. It is very deep. It has two buckets so that the people will get the water out. We drink some of that water. It tastes good.

An Adobe House

Our homes in Agua Fria are made of adobes. Adobes are made from the soil and as some kinds of soil will not stick together not all kinds of soil can be used to make adobes. The soil in Agua Fria can be used very successfully. We make adobes by mixing soil, straw, and water together. We put this mixture in a mold which shapes the mud bricks. Then we turn the bricks out on a clean dry spot, and let them dry for two or three days before we put them into the walls of a house.

The roofs of our homes are flat. After the walls are laid, we put vigas across from one wall to the opposite wall. Vigas are large trees that have been dressed for this purpose. They are placed about two feet apart. Then we lay pine slabs over the vigas. On top of the boards tar paper is put; last we put dirt. Drains for the water are placed on the edge of the roof. The frames for the doors and windows are set in place when the walls are being built. Our homes are not expensive. They are light and airy. They are warm in winter and cool in the summer because of the thick walls.

What Started Us

The study of the land may begin with the study of food, clothing, and shelter. For example, what does the land have to do with oatmeal, corn

flakes, milk, bread, and butter? Growing seeds and visiting mills, dairies, and markets may also be related to the study of the land.

An older group in Utah became interested in the parts of the plants eaten by people and by animals. The place of the humble plants in the universe becomes of endless interest: how they take the raw materials from air, soil, and water and, with the help of the sun, manufacture food that animals and man can eat, how they hold and bind the soil.

Cotton in our warm and sunny areas is a familiar product. Discovering the many uses of cotton, from dresses to phonograph records made from cottonseed, leads into a thousand interests of cotton growing and its wear and tear on the land—to manufacturing, migrant labor, transportation, and world trade.

Tanning leather and spinning and weaving wool are activities in many of our communities. The Chimayo blankets of the Spanish-Americans and the bay Navajo blankets are woven in some of our Southwestern homes. Parents and adults of the community are experts on types of wools, the strength and suitability of the fiber. Fiber is affected by feed; feed grows on the land. This is a fascinating field of investigation. Proper grazing of the land, care of stock, reproduction of plants, and water for stock may have their starting point with a hand-woven blanket.

Houses in our country are made from products near at hand—adobe houses from the adobe mud, beams from the pines of the forest, log cabins where trees grow, Apache wickiups from the tough bear grass of the desert, Navajo hogans from piñon logs and mud, Hopi houses from adobe and stone. The flat roofs of the semiarid climates and the pitched roofs of the mountain sections where much snow and rainfall indicate our dependence on and adaptation to our climate.

The sparks which start interest in and investigation of conservation are infinitely varied. A threshing machine near a school, a hillside on which were many bones of deer, and mention of a bird once familiar in the community but now gone, led to investigation of reasons.

Unusual conditions, or occasionally a disaster, serve as a starting point. A flood on the Rio Grande, the worst in years, led to the appraisal of farm land lost, other property damage, and the study of the recurrence of floods—their causes and possible control. But the most lasting conservation education is based on everyday, continuing interests, rather than disastrous or unusual happenings.

The very usualness of happenings in rural living has often blinded us to the opportunities and adventurous learning which spring from these events, but the simplest and most commonplace happening may lead to many exciting fields of learning.

A news item or radio broadcast about dairy products for England may

start a whole investigation of dairy herds, land conditions, home diet, and school lunch

The finding of a flower, which used to be abundant and has now almost disappeared, started one class in Arizona on a wild flower protective league which decided to bring back to the mountain behind the school the wild flowers that had nearly disappeared

In a school in Utah the sign "SCS" was new to the school, so they investigated it, asked a man from the Soil Conservation Service to explain what the organization was, and why it was formed.

A gift of slightly wormy apples started one school in Colorado on a campaign "Why," said the boys who had studied agriculture, "should one woman endanger the fruit crop of a valley because she wouldn't spray or farm seriously?"

During a very cold and snowy winter pupils observed that the animals were eating the bark and inner bark of trees. This led to study of the cambium layer of a tree, the usual food of various animals, and the harm done to trees by girdling.

The San Simon flood in Arizona is a periodic but spectacular event that led one school to study the Gila River watershed. The San Simon is known as a wash, in effect a deep, sandy, dry stream-bed, which in flood time concentrates the water in a boiling, muddy torrent. Yet in the memory of parents, this was a grassy swale. What changed it? Why does it now contribute much of the silt and only a small proportion of the water to the San Carlos reservoir?

Bad crop or good crop, bad prices or good prices, are common topics of conversation in the country. Perhaps it's weather or cut worms or grasshoppers. Perhaps it's changed markets or war.

The delicious smell of a school lunch led to an investigation of how the foods were prepared and where the products came from, and to extension of interest to parents and the canning of fruit and vegetables not needed at home. Valuable contributions to the diet, such as oranges, were arranged for by exchange of sugar-beet seed. Entertainments by school and parents raised money for dairy products which were not produced in that particular community.

Arbor Day has changed from the planting of a single tree to plantings for erosion control, windbreaks, grass, shrubs, trees in gullies.

A swirl of dust in a schoolyard started an exhaustive study of dust storms, beginning with the schoolyard, which was bare, and comparing it with the nearby graveyard, which was fenced in and grassed, an activity that ended with a fenced schoolyard with trees, grass, and shrubs.

A stagnant pool, where mosquitos bred, led to a study of water, insects, malaria, which in turn led to the establishment of a small park where water ran in and out of the pool.

A beaver dam near a school led to an extensive study of beavers as conservationists—engineers, foresters, and agronomists—and branched out into the planning of a watershed, with study of its rivers, forests, grasslands, cities, and farms, and investigation of various agencies working on the watershed, with the help available to individuals and the necessity for group action

Trips to big dams, the Grand Canyon or many other canyons, national parks, prehistoric dwellings, and dinosaurs' footprints have been starting points. Collections of rocks, fossils, pottery shards, arrowheads, colored Indian corn, woven belts, or drums may be others.

A group of children in Arizona spent their recess near an irrigation ditch and one day began talking of where the water came from—the big lateral, the main canal, the river, and the reservoir. The water cycle—the rain and snow in the high elevations, the big storage dams which make water available during the growing season, the travel of water from the upper watershed to the irrigated valleys—furnished subjects for investigation. The scarcity of water and the boon of water became part of the children's awareness so that leaking faucets were mended, plants were grown near the pump where the drip ran down, and waste of water became taboo.

We Act

Activities in rural schools often necessarily differ from activities in city schools. In the country, children's lives are made up of activities—often arduous and too heavy. Children help their fathers with the farm work, they peel apples for canning, they haul water and wood, they build fires, and have an infinite variety of what educators call "activities" and what they and their families call "work." Taking care of a rabbit in a city school may be a very novel and thrilling experience, but it is not so novel and thrilling to a boy who has managed a huge stallion, who has got up in the cold and dark to feed the animals, who has been called away from a book to feed the chickens, or has delayed going to the movies to milk the cows. Yet home and school can become interacting and "work" with understanding takes on a new interest.

The pupil's understanding of the world in which he lives comes from his understanding of the home, farm, and community. The following reports written by pupils in a rural school illustrate the point.

We took an excursion to one of the weavers. We took pictures of Dona Seferina, blankets, loom, cards, sheep, wool, dyes, and spindles. We asked questions.

Dona Seferina has two kinds of sheep. White sheep and Lincoln sheep. She got the Lincoln sheep from Blanco and Alamosa. The white sheep give heavier wool than the Lincoln sheep. Wool sells at 35¢ a pound. Yarn is worth \$2.50 a pound.

Friday News, March 24

Jimmie has started to weave on the foot loom. Tony started the hooked rug. Frutoso couldn't card the wool he brought because it was such poor wool. He is now carding mohair. Melescandro is the storekeeper. He has all kinds of yarn to sell. The beans and corn on our ranch are growing tall. The grass on our ranch was so tall that we had to cut it. We gave it to Sergio to take it home for his rabbit. The rabbit was glad to get the nice green grass.

Making Adobes

Sergio and Sotero are making the adobe brick for our house. They made the forms of wood. The size is 2 in. by 4 in. They are making them in the school yard. Straw is mixed with the mud to make it stick together well.

We took a trip to Mr. Maestras' place. We went there to look at the new house. We want to build our house something like this one. We will make a change in the porch. They have their nice porch in the back of the house and we want to build ours in front of the house. The first thing we will do is to draw a plan for the house.

We all decided to stucco the outside of the house. Joseph is going to find out how a good roof is made.

We are going to plant trees and sow grass all around the house.

Field trips or study walks are a universal activity in conservation programs. Their scope and conduct depends a good deal on the objective. They may initiate a piece of work with the objective of giving a broad base of understanding—the watershed as a whole, the behavior of soil and water, topography, vegetation, wildlife, the activity of human beings on the watershed.

A school in Colorado near the Indian ruins of Mesa Verde used the life of yesterday for the lessons of today.

History of the Land

A big arroyo went across the field just below the village site. We all went down to look at it. It was estimated that it was about seventy-five feet across and sixty feet deep. One of the fathers told us that it extended across the country for a mile.

We raised the question, "Was the arroyo here when the Basket Makers¹ lived here?"

A father told us that when he was a boy in 1908 the gully had been about two feet deep and he could step across it any place. Another volunteered that his uncle had been a "cowman" on the range in the early days and that at that time the arroyo had been a cow path. Questions brought out the fact that the whole eastern end of the valley was gutted with arroyos and that the government was controlling grazing in the upper watershed, building dams, and grassing gully slopes to check the erosion.

¹ The prehistoric Indians who lived at Mesa Verde.

We put down in our notebooks the problem to discuss later "Why is erosion taking place in this particular part of the country?"

One of the fathers volunteered to take a committee to see some erosion control practices

Later on at school when we tackled the problem of erosion in the eastern end of the county, it was decided that before the settlers cleared the ground for farms, the soil was tacked down by grass, sagebrush, oak brush, and other vegetation. We decided that the snow was held back from melting and running off so fast by the cedar and piñon trees, and the grass in the hills before so many of them were cleared away.

The children felt that the fields should be planted with crops that would tack down the soil and that it possible something should be done to delay the "run-off" of water from the mountains.

An understanding of some of the maladjustments arising from poor use of resources—forests gutted, grasslands misused, farmland improperly planned and used, mines wastefully developed, streams polluted, wildlife destroyed—can be given to all pupils by observation. But the actual solution involves so much of social planning—action, laws, education—that children's direct activity in conservation may seem slight in solving the whole problem. Windbreaks, woodlots, and community forests are worthwhile activities. Personal care with fires is a fine step. Respect for birds, with birdhouses and sanctuaries, are possible activities within the framework of a larger plan.

Erosion control in schoolyards—windbreaks, gully prevention—give practice and application of an aid in erosion control. However, emphasis on structures rather than watershed control involving natural cover, emphasis on cure rather than prevention, is an emphasis which should be guarded against.

In our search for activity in connection with conservation education, a definite warning should be sounded. Overemphasis on children's activities, which in the light of mass misuse, exploitation, and lack of planning inevitably are very slight, should not be allowed to limit students' ability to see the broader necessities of group action.

Some of the most significant activities in the Southwest are those which have led to an understanding and attitude which will undoubtedly show its mark in the future lives of the entire school. At the Nambe School in New Mexico, whose schoolyard was a dreary waste of bare soil, the children decided to beautify the school with flowers, trees, and grass if possible.

The watering of plants immediately became a problem, as the school supply of water was only about enough to supply the drinking and sanitary needs of the school. Every device was used to get water on the plants—waste water, water from eaves' pipes, and finally water led off from the

borrow ditches of the road. No run-off of water was ever allowed to go unused and when snow fell it was swept into the basin surrounding the trees. No faucet was allowed to drip. Wheat was planted in the basins of the trees to see whether it would help conserve moisture and enrich soil. Many other conservation, school, and community activities have developed, but the outstanding accomplishment in that school is the consciousness of the benefit of water and its practical use and the respect for vegetation as soil and water holders, as food, as shade, and as enjoyment. The school grounds, once bare dirt, have two hundred trees, vegetable and flower gardens, grass plots and terraces.

Another school had a gift of many small trees. The pupils planted and cared for them but were not always careful about closing the gate. In this country, livestock is apt to wander around at will. Several little trees were eaten by a horse. The boys and girls were appalled and with much trouble and expense got new trees, built wooden frameworks, put in a cattle guard, and since then have purchased grass seed, planted flowers, and arranged for irrigation. But best of all, in a stock country, the children have learned the important lesson of fences, gates, and protected fields and orchards.

School gardens in the past have too often been a planting of radishes by little children, a raiding and eating of radishes by big ones. Recently some of the most effective school gardens have been the planting of food to supplement the community diet. In a community of beans and chile diet, tomatoes were introduced. A great deal of consultation with the county agent and experimenting with location, soils, and water supply were carried on. Finally, successful tomatoes were grown and eaten fresh or canned for school lunches. The community became so interested that the school became growers and purveyors of tomatoes to the community.

The introduction of certain foods into the diet is of extreme importance in many of our rural areas, dairy products, green vegetables, meat, and eggs are invaluable. What the children learn about food and nutrition is revealed in their accounts of activities that follow.

We Made Butter

We put cream in a jar. The boys and girls shook the jar. Soon we saw bits of butter on the jar. We washed the butter. We put salt in it. We ate the butter on crackers.

We Made Soup

The children brought vegetables. Angie brought the carrots. Salamon brought the parsnips. Lorencito brought the tomatoes. Dwight brought the onions. Miranda brought the cabbage.

The girls washed the vegetables. The girls cooked the vegetables. Mrs. Ford put in the butter and the salt. We ate the soup for lunch. It was very good. The girls liked the soup. The boys liked the soup. The boys said, "Thank you, girls."

An older group in Utah goes into the school lunch more deeply.

We visited many of the farms and discussed with the farmers something of their plan for their gardens in order to allow for adequate and correct selection of vegetables and fruits for the lunch.

They explained to us how they arranged for the time and the cartage.

We visited the various industries such as the flour mill, apple cannery, etc., to find out how they cooperated with the lunch program.

We worked out an arithmetic book or small ledger to show the cost, quantities, and general bookkeeping in relationship to the carrying on of such a lunch. (This included the tickets and incidental expenses of administering the business.)

The number of animals versus quality is a constant problem and an important concept in proper land use. A great number of horses is still a symbol of prosperity to many Indians, altho the horses may be poor and the land not able to sustain them. A community emphasis of one school was to show that one good work horse gave more work, ate less food, and was better for the land and the people than several scrubby horses.

An activity of great significance was carried out by a rural mountain teacher. Goats are common animals in Spanish-American families and goats are hard on the land, especially in a community where grazing land has become more and more restricted. In a small community it was found that one little boy was tending goats and that the goats were very poor, supplying little milk. The market for mohair no longer existed and following in the footsteps of the hungry goats were less and less vegetation, cuts and gullies, loss of precious land. Yet goats had a real place in the food supply and economy of the village. The school procured twelve kids from stock producing much milk. They were loaned to different families but it was the children's project. The pupils learned to care for the kids. As one child wrote "The kids were pretty soon growing up. They were growing up as big and fat as a pig. They are not like the goats from here. These goats from here are very thin and eat as much as the others and give less milk. While these other goats eat as much and are fat and give lots of milk." These children were learning invaluable lessons of proper stock selection and feeding, and of caring for land. They were having actual experience, not with a dairy cow, which was impossible for each family in this land of sparse vegetation, but with a dairy animal which could be supported and which was of great value to the family diet.

Conservation-Minded Citizens

Youth of today are gaining understanding and respect for the natural world around them, are realizing man's dependence on his environment, are recognizing the mistakes that have been made and the adjustment and solution being sought. The writing of boys and girls reveals the understanding they have developed. For example.

Youth understands conservation as wise use—not useless hoarding.

Natural resources are forests, grass, wild animals and fish, rivers and lakes and land

Human resources are living people.

People would have a hard time if they had no land and no water or plants or animals

People are careless with fires in the forest. People put too many animals on the land. Sometimes they plow their fields up and down. Floods come and destroy the people.

It would be better if they would take care of their forests and fields and grazing lands. Then everybody could have wood and food and clothing.

Conservation of soil means the wise use of soil for many people.

Conservation of forest means careful cutting for sustained yield, grazing which does not destroy the grass and shrubs, protection against fire and insects.

Conservation of grasslands means controlled grazing and range management so that grass will come back for future use.

The concept of man's dependence on his natural resources and the interdependence and interaction of soil, water, plants, animals, and weather is expressed in many ways.

Food, Shelter, and Clothing Stem from the Land

We use the land a lot. We walk on it. We build our homes on it. We go to school on the land. We get fuel from the land. All the plants we eat come from the land. We make a living from the land. We could not live without it. The plants get their food from the land. Then we eat some of the plants and get the food out of the land.

Milk is a good food for children. We drink milk every day. We drink milk to have good bones. We drink milk to have good teeth. We get milk from the cow. We get milk from the goat.

Meat is a food. The animals give us meats. Mother cooks the meat. The cow gives us meat. The pig gives us meat. The goat gives us meat. The lambs give us meat. Rabbits and chickens give us meat.

Plants also furnish us with clothing. We get clothing from animals also, but animals have to eat plants in order to live.

I build my house of mud and straw.

Of mud and straw I build it.

Strong timbers make my vigas.

From mud and straw and trees I build my house.

Sun, Air, and Water Necessary to Man, Plants, and Animals

Man, animals, and plants need sun, air, and water to live. We need plants and animals for food. Plants need the earth for food. Animals need sunshine, the earth, water, and air, and plants. Man, plants, and animals need each other. All must have sun, air, and water.

Your Choice

Poor land—poor stock, poor people

Good land—good stock, prosperous people

Roots hold the water. They hold the soil too We need the soil and water to raise our food

Youth learns by observation and study of the behavior of soil and water the importance of the entire watershed and how man can upset it

One day the sun was very warm It took many raindrops into the air. The little raindrops came together. They made a big dark cloud

The wind began to blow The air cooled. The raindrops came down slowly, then faster and faster Some of the raindrops found grass, and gave it a drink. Some found trees and flowers and gave them a drink Some raindrops did not find trees They did not find any flowers. They did not find any grass They did not find any seeds. The little raindrops could not do any good

David looked at the land. He saw the little muddy raindrops run away He saw the soil blow away David said, "I will plant a garden I will plant some seeds. The roots will hold the soil together It will not blow away The rain will come down. The rain will help the seeds grow The sun will shine The sun will help the seeds grow."

A raindrop fell into a brook A cow came along and drank it. Then it became part of the cow

The Early Watershed

The Nambe River has its sources in the Sangre de Cristo Mountains. The rain and snow that fall on the mountains furnish water for the river. The valley depends upon this water for its crops

There were few fish in the river. These were found in the headwaters There was plenty of wild game. There was duck, quail, turkey, deer, antelope, buffalo, and beaver

There was much vegetation on the mountains and foothills Much juniper and piñon covered the foothills. People got their firewood, fence posts, and logs from nearby Higher up they found much Ponderosa Pine, Spruce and Fir

The grasses most commonly found were the gramas and a few brome grasses They grew to a height of from 2 to 3 feet. Much livestock was grazed in the valley and the nearby hills At Loma Blanca there was a very good stand of Blue Grama

There were 15 families living in the valley

People lived well because of the abundance of land, food, and water. They were very independent people

The Watershed Today

The Nambe watershed is greatly changed from that of earlier days. The range has been overgrazed and suffered drought so the grasses have not come back Inferior types of vegetation have come upon the land Much of the juniper and piñon that covered the foothills is gone The trees and grass helped to prevent erosion and also enriched the soil People have carelessly cut these trees Much serious erosion has set in People have to go farther away for wood.

The moisture that comes from the rains and snows does not remain as there is not enough vegetative covering to hold it. Snow is all melted by the middle of May. The water supply for irrigation is very scarce at the time it is most needed. There is very little livestock now. Most people have about one-half of their farmland to feed the livestock they have. And even on the farms there are many gullies.

The government has taken over the upper watershed. Rangers and other forest officials are appointed to care for it. They watch for forest fires; they restrict grazing; they prohibit careless tree-cutting and they help to protect wild game.

In the valley there are now 149 families. The population is over 650 persons. Since there is less good land and an increasing population, each family has less land. The practice of dividing the land among heirs has also resulted in each family having less land. The average family has about 3 or 4 acres. In order to live, the men have to look for work away from the community.

People live less comfortably and less securely than they did in earlier days. They are more dependent than they were.

It rained very hard yesterday. Much water came down the river. It came down very fast. There was much water running down the arroyos. There were leaves and small plants in the water. The water was brown like coffee from the soil it was carrying away.

We watched the water on the school ground. Some of the water went into the soil. Some of the water ran down to the trees. Some of the water made little ditches on the school ground. The water in the terraces waited in little pools until it went into the soil. It did not run down to the playground. The plants held the water and soil. The way the terraces are built helped to hold the water. Sometimes some of the water in the terraces evaporates before it goes into the soil.

We did not lose much in the school grounds. Some of the water went into the roots of the trees. Some of the water went into the roots of the plants. The water that evaporated was not wasted because it goes into the air and comes back to the earth.

To youth in the Southwest, sustained yield is not just a term used by foresters and other technical men but is a principle that applies to forests, grass, soil, farms, animals.

The forests are on the mountains. Many trees live in the forest. The woodsmen cut some of the big trees. Then the little trees have more room to grow. The little trees need sunshine. We must not cut the baby trees.

We need plants and grass in the mountains too. Grass tops make food. Let plants grow leaves and seed.

The roots burn and die in the sun without the tops. Then we have dust.

Good Grazing

This is the place where Carmuel goats eat. They eat grass. They eat weeds. They eat oak branches. One should not have too many goats in one place or the grass will die.

The pattern of erosion in the Southwest is familiar to its youth and they suggest what man can do about it. An entire class contributed to this history of land use

Moving Westward

The people began to emigrate from Europe to North America in the 15th and 16th centuries. They farmed the good soil but as the population increased they moved north and west. The people were very wasteful. They cut and burned the forests and the prairie grass in their haste to get the land ready for cultivation. Whenever the land started to erode or become less fertile, many of the farmers moved still westward, until today there is no more west, and we have to rebuild the depleted soil.

Breaking the Sod

People had to have land to cultivate in order to raise food. The pioneers broke new lands and turned the sod under. They felled many trees. Hundreds of acres of land were broken up in a short time by modern machinery. This wide-spread breaking up of the sod hastened man-made erosion of the land. The cover crops were destroyed and rain and wind carried away the good topsoil.

Gullied Land

Land that has been overgrazed for a long time or that has not been well-protected, usually has big gullies and arroyos in it. Land that is gullied is useless for farming. The vegetation will not return to it for many years even though much work may be done on it. It makes the floods worse because there is nothing to slow down the water and hold the soil.

Overgrazing

The Great Plains and the Rocky Mountain area of the United States were once covered with a thick growth of grasses. However, less than 75 years ago man began to raise large herds of cattle and flocks of sheep. This stock grazed over the pasture lands until the grass was eaten off and the surface of the ground was broken by the sharp hoofs of the animals. There were no regulations to control grazing, so much of the land that was once covered with plants is now a desert or semidesert.

Once upon a time there was a hill. It had much grass. And there was a farmer. He had many goats. He let one of the goats go and eat grass on the hill. And the goat did not eat too much because she was very fat indeed. And so the farmer let another goat go and she ate more grass. The other goats went to the hill and there was no more grass on the hill. So then one day there was a rain. It flooded. Much water was falling. It made a big arroyo, many of them.

Dust Storms

The United States Government opened large tracts of land for settlement in the early days of the twentieth century. This land was in northwestern Oklahoma, Kansas, Colorado, Texas, and eastern New Mexico. The new settlers plowed thousands of acres of land. At first crops were good, but soon the land

began to be depleted by poor farming practices. In 1931 a severe drouth started. It grew worse and worse until 1936. No crops were raised. The soil of the fields blew away until the "Dust Bowl" was formed. Sand and dust covered roads, fences, and houses.

Soil does not belong to one man. It belongs to the race. Men now realize how important it is to conserve the soil. It has taken millions of years to make our soil, so we should try to protect it in every way we can.

The children's story closes with an account of erosion in their own valley and of ways of combating it, such as reduction of grazing, alternation of grazing in different fields, planting clover between rows of corn, reforesting of areas once wooded, planting windbreaks, and contour plowing.

Action for Today and Tomorrow

What is the carry-over from all the activities, understandings, information? What will they be, these young people, when they grow up—geologist, dairyman, forester, fruit grower, city planner, rancher, builder, weather man, storekeeper, artist, architect, shoemaker, or farmer? Whatever their various occupations, conservation-minded youth in all probability will be citizens aware of conservation.

There has not been enough time to see how these conservation-minded students act as full-fledged citizens. Many of them are young and still in school. Many of them are in the armed forces. Much of what they are doing day by day has been described in their own words, but a few examples of action following school programs may give some clue to future action.

A group of high-school students from four states met and discussed the land problem and what they could do about it as citizens. They conducted their own meetings, called in outside speakers, ran their press and radio publicity. The following excerpts from a high-school student's letter shows continuing interest.

I paid special attention to all of the speakers in the attempt to find suggestions that would help my Dad and our neighbors to rebuild their land.

I went right home and practiced on my Dad. I guess I was a little over-anxious for he was skeptical at first. I'll have to admit that I was a little leery myself before I had the opportunity to go to Albuquerque and see firsthand what could actually be done by contouring pastures, farming on the contour, and enforcing other conservation programs. It seemed to me Dad was unreasonably doubtful and Scotchly stubborn.

At last we met halfway. He is willing to try what he considers the most practical programs this year. If they were effective he would try others next year. I think he is planning to ditch some of the old wagon trails and cattle paths similar to the ditching which we saw on the Elena Gallegos Grant to prevent gullying and washing.

A group in Curry County in eastern New Mexico was so interested in forming a soil conservation district that they made a farm-to-farm survey

of land conditions and income, prepared and gave radio talks, wrote newspaper articles, and felt sure that they were largely responsible when the district was voted 100 percent. This group will undoubtedly continue to be actively interested in land and will be active and informed members of their district.

Many groups of future land users have learned the invaluable lesson of cooperation. In the past farmers perhaps more than any other group have remained individualists. Rural children today, becoming aware of problems of use of resources that demand group action, are learning to work together. They are aware of the disasters of individual thinking and acting and have seen what groups can do. They are on speaking terms with the many agencies set up to assist them and have talked with the men—have asked their help in making school gardens and in planning school grounds. In fact and usage, rural children are learning to regard federal, county, and local government agencies as their own.

The boys and girls have gained a new knowledge and respect for the various culture groups. They realize that the Indians in very ancient days were familiar with irrigation methods, built check dams to catch soil, and rotated their corn and beans, and that often groups of people long familiar with their environment have used it wisely.

They have mastered the common sense of many practices—that a forest entirely cut over will not reproduce and continue its usefulness, but that small seed trees left will continue to produce; that contours on the land hold water and soil and plants, and that the land thus formed will bring forth crops year after year.

They have grown tomatoes, carrots, and other vegetables, taken care of animals, and learned to like new foods.

They have learned that fewer goats than the community once had, better bred and better fed, produce more and leave enough cover on the ground to enable future generations to go on keeping goats.

Perhaps most significant of all, they are distinguishing between immediate cash, which is transient, and perpetual resources which can be permanent and which will make "good living" possible indefinitely.

SHORT REPORTS FROM SCHOOLS

Activities in which the children of one community engage are often not needed in another community. Conservation education is based on the needs of communities and regions. The following excerpts from reports were selected with a view to presenting a variety of activities with emphasis on forests and trees.

RURAL-SCHOOL CONSERVATION ACTIVITIES

R. S. Ihlenfeldt

A survey of rural-school conservation activities in Wisconsin reveals the following in various counties:

<i>County</i>	<i>Activity</i>
Barron	Organization of student ranger patrols, and conservation work generally.
Door	Rearing and releasing pheasants, and conservation work generally.
Douglas	Pursuits in the numerous school forests of the county. Conservation poster contest.
Iron	Topographical maps in which a color scheme indicates timber, swamp, marsh, and lake areas
Monroe	Fifty-six acres planted to trees by the children. Rearing and releasing pheasants. Wind-belt planting. Countywide soil improvement program
Oconto	Conservation tours for seventh and eighth grades. Countywide soil improvement program. Rearing, feeding, and releasing pheasants
Rock	Countywide program of tree planting demonstrations.
Taylor	Activities in nine school forests. Beautification of fifty schoolyards
Trempealeau	Development of a science course which includes conservation projects and activities. Conservation broadcasts. Conservation tours
Washburn	Activities in rural-school forests. Planning nature trails. Forests are said to be extensively used for conservation work.
Waukesha	Highly developed school garden and flower program.
Waushara	Special tree planting programs since 1935. Growth of legumes emphasized in schools. Alfalfa acreage increased from 8070 acres in 1933 to 23,437 in 1940. Clover increased from 10,563 in 1933 to 21,173 in 1940. Since 1935, 3,297,977 trees planted
Wood	Intensive work done in two school forests. General conservation values emphasized in regular school work.

The most popular activities reported are as follows:

1. Purchase and planting of school forests
2. Development of topographical maps
3. Rearing and releasing pheasants
4. School-ground beautification
5. Soil improvement programs in which children take soil samplings
6. Tree planting activities including countywide demonstrations
7. Development of science programs which will have conservation as a core element
8. Garden programs, particularly in Waukesha County

A teacher training camp is maintained each summer thru the cooperative effort of the state teachers colleges. Last year it was located in the heart of the forest and wildlife area at Eagle River. About sixty teachers attended and two dozen or more had to be refused enrolment when the capacity of the camp was reached. A section of the Wisconsin education program was devoted to conservation with conservation demonstrations by classes from two normals.

JUNIOR CONSERVATION CLUBS

Otilia Frisch

Saginaw County, Michigan, reports junior conservation clubs. These are assisted by the Saginaw County Conservation Council, which is made up of local organizations interested in conservation. Activities of the clubs include:

1. Conducting a census among farmers to learn how much land they will devote to plantings for birds and other wildlife.
2. Questioning farmers in the school district to learn why land is posted against hunting. Listing farmers' reasons that city sportsmen may know how they can merit farmers' cooperation in hunting and other outdoor activities.
3. Making a map of the home farm to indicate present location of good game cover; locations suited to future planting of good game cover; locations of birds seen on nests in fields, trees, etc., during the summer.
4. Building nature trails and labeling trees, shrubs, and other interesting objects in woods.

CONSERVATION OF FORESTS

Florence K. Jenkins

The pupils of the upper grades in a two-teacher school in New York State prepared their own report for the yearbook. Their interest in conservation of forests began when a forest fire ran thru a wooded section where they had for several years been getting trees to plant on the school ground on Arbor Day. With the aid of the teacher's car and the bicycles of some of the pupils, the school took a trip to the burned-over area, and then by way of comparison visited green woodlands near the school. After discussing their observations, they set up a plan for study of forests in general and those of their community in particular. They studied maps, sketched woods trails, listened to radio programs and phonograph records, talked with the people of the community, studied state and national problems in the conservation of forests. When their study was complete, they planned their report cooperatively. Part of it reads as follows:

It was a long time probably before people realized the seriousness of the Nation's forest losses, but during the last few years we have begun to conserve the forests we have

When trees are cut for fuel or lumber, small trees are left to grow and to replace them "Seed trees" are left here and there to help in natural reforestation. Many farmers, communities, or schools may buy small trees for reforesting from our state conservation department and plant large areas each year. A growing forest is a beautiful sight and a satisfaction to the planter. He feels that he has really done something worthwhile.

We need trees to regulate our water supply. We need trees for lumber. We like wooden houses and we want to build them, stone and cement seem cold. When we get our homes built we want to plant the home grounds with beautiful trees.

We need trees for homes for birds and animals, for windbreaks on bleak farms, for sheltered spots for wild flowers, for picnic spots, for fence posts, and bridges.

We need trees because they are money-makers. From them we can sell logs for fireplaces, Christmas wreaths to hang over fireplaces, nuts and maple sugar to nibble on as we sit around the hearth.

Here at home we shall have to learn how to fight the insects that harm our trees. We shall have to build firebreaks and help fight fires. We shall have to plant trees to hold back our water supply.

It is not necessary to wait for a forest fire to initiate conservation activities. Any school in the state can do its share to encourage conservation of trees by securing trees from the state conservation department to be set out at school or home, by getting the community interested in reforestation, and by campaigns to prevent the careless habits with fire that lead to wide destruction of forests every year.

A FIELD TRIP

Katharine G. Gabriel

To help make our conservation study real, and not just textbook work, I like to take the pupils on field trips, especially when the weather is good. A field trip is a simple matter even for a one-room school, if there are few enough pupils to form a single discussion group. With a large school, the trip presents difficulties. Last year, with twenty-one pupils of a wide range of ages, I was dissatisfied until I tried a plan that pleased us all.

In September we had organized an Audubon Club. We did not limit our work to the study of birds, but included nature in general with emphasis on forests for the year. The club held regular meetings every second Friday at 8:30 in the morning. If a hike was scheduled, we met at 8:00. At each second meeting, weather permitting, we planned for a half-hour hike. The children enjoyed these hikes immensely. I was not pleased at first, though, because I could not keep all the pupils close enough together to benefit from discussions. I began to feel that the time was being wasted.

One afternoon we divided the group into three sections, each with a seventh-grade boy as leader. The three boys chosen were boys who had been disturbing factors on other hikes. We also decided on a special interest for the hike—trees. Each group chose its own route and planned to what items its attention should be given. I went with the group which was led by the boy that I thought would need most guidance himself. I was pleasantly surprised at his ability as a leader and at his keen interest in the problem at hand. At the appointed time after the trip we arrived at the schoolhouse and held our meeting. Each person reported on something that had interested him. After that our trips were more profitable. Once we went to a white pine grove to inspect the trees for blister rust and we followed that with eradication of currant and gooseberry bushes nearby.

CONSERVATION IN AN INTEGRATED PROGRAM

J. Guy Rowland

We have not overlooked the conservation of natural and human resources in any field of our curriculum work. One of the channels through which we have given direct information and materials on the subject is our recently inaugurated course in Washington state history—its industries, resources, and government. We have cooperated with the department of forestry in the circulation among the schools of a film entitled, "Trees for Future," which shows in detail problems which must be faced and methods of overcoming them. We have encouraged a study of conservation in the organizations of our state, and we have found that the parent-teacher association, state directors association, and many civic clubs have become extremely mindful of the conservation problem as a result of our educational program.

Some schools have contributed to the conservation program by planting trees in burned-over areas which have been logged some years in the past. This has been done not only in the urban areas but also in the rural areas.

The defense industry in our state has resulted in serious manpower shortages. The schools have cooperated with the forestry department in providing a means whereby high-school boys might continue with their schoolwork and still serve in the important job of fighting forest fires, which are always a menace in forested areas.

CHAPTER IV

The School's Responsibility for the Nation's Human Resources

IN THE DEVELOPMENT of the human race, ways of living and the chance to make a livelihood parallel in importance the natural resources and are dependent on them. It is not fitting to discuss the conservation of natural resources without full cognizance of the optimum welfare of all the people, nor is it possible to speak of human welfare as independent of the natural resources. If thru the schools there can be developed an enlightened citizenry that will not tolerate abuse of the natural resources or exploitation of groups or individuals regardless of whom they represent, then indeed we may look forward to a nationwide program in the interrelated development of natural and human resources that will have for its sole objective the continuous welfare of the human race.

In this chapter, "Conservation of Human Resources" presents the tragic problems which the nation must solve if it would not sacrifice the well-being of all. The article shows wherein for the large majority we have failed to solve at least two of these problems—health and education—and tells what needs to be done. "Human Resources in the School Program" has suggestions for teachers for the "development of a future generation who will understand their own and the nation's human problems and be able to cope with them." "Conservation Means Better Rural Living" is the story of one school's successful efforts to raise incomes and standards of living in the community thru wiser use of the community's natural resources. "Community Schools Improve Human Resources" shows that improvements can often be made with resources that are available.

CONSERVATION OF HUMAN RESOURCES

Fred G. Wale

The conservation of natural resources can be justified for one reason, and for one alone—its usefulness to man. The earth's wealth is worthless if it is not made to serve those who live on the earth. Any study of conservation, therefore, must include some regard for the conservation of human resources.

A country is made up of land and people. Necessary to its success is the welfare of its men, women, and children. For a time we may waste oil and gas, abuse our forests, pollute our streams, and still be the world's leading nation. We cannot too long neglect our people without permanently injuring the welfare of all.

In spite of dramatic, scientific discoveries, and in the face of much recent reform, we must admit that there are many areas of distress spread over the country as a whole from Maine to California, from Michigan to the Gulf. No single state or region is without this misfortune, no community exists without its other-side-of-the-railroad-track. Furthermore, the conditions of distress—malnutrition, bad housing, poor schools—grow out of widespread and deeply rooted maladjustments, often accepted as common practice in our social and economic life. The thin veneer of charity and goodwill cannot undo the wrong. Single communities, acting independently thru such commendable organizations as the community chest, can effect only surface gains. The well-intentioned Christmas basket carried to Mrs. Maloney and her ten children will bloat little tummies for a week, but by January 15 the gloom will have returned, this time with even greater intensity. The operation to remove the disease will be successful only if it is as deep-rooted as the disease itself.

Nutrition and Medical Care

The distress of malnutrition and the lack of adequate medical care are not confined to a single race, region, or occupation. White families suffer equally with Negroes, the central states with the southern, the slum dweller with the farmer. There is small choice among the disadvantaged third of our nation; little economic difference between the rocky New England farm, the cut-over timber lands of Michigan, the land of Egypt of southern Illinois, the counties of southeast Missouri, the cannery communities along the Eastern Shore, the migratory trails of California and Florida, the Mississippi delta land, the Tom Towns of the South, and the slums of any city.

Examine practically any health figure within these distressed areas and probably you will come up ashamed of the facts.

From Cape Girardeau, Missouri, to Memphis, Tennessee, is a distance of 180 miles. To drive it one goes due south thru Scott, New Madrid, and Pemiscot counties, and on into Mississippi County, Arkansas. In all this distance of good earth mixed with bad living there is not a single hospital and no county infirmary.

In the southern thirty-four counties of Illinois there is one tuberculosis sanitarium. It serves a population of over a million people and has a bed capacity of 125, which is the same as the number of deaths from tuberculosis recorded in Union County, Illinois, during the period 1928-32.

In Georgia less than ten rural homes in forty have any sanitary means of sewage disposal. Communicable diseases accounted for one and one-third million days of disablement among Georgia people during 1938, an equivalent of 3500 years, and at a cost of \$136,000,000.

South Carolina needs three times as many doctors as, it has if it is to be as well supplied as California.

California provides little, if any, organized medical care for its vast army of migrant workers, 150,000 of whom are at work in the San Joaquin Valley alone

Texas spends from state funds 3½ cents per capita annually for health services, approximately the same amount allocated for the welfare of its livestock.

We need not multiply these references. A little research will convince the reader that the health of our nation is not sound. While he reads this, however, he may say to himself: "But I feel fine. I'm not sick, and in normal times when I am, I can get to a doctor, a hospital, or to a dentist in quick order." The answer, of course, is that the opportunities of the individual are not those of the nation. For example, in Georgia, with its 150 counties, there are 2 counties without a doctor, 26 counties without a dentist, 85 counties without a public health service, and 104 counties without a general hospital

The facts for Georgia are given not because this state is the most backward, but because thru its alert Fact Finding Committee recent studies have revealed the figures. Actually Georgia is ahead of many other sections of the country, a condition due in part to the work of this citizens' committee. Let the reader examine the southern thirty-four counties of Illinois and the southeastern counties of Missouri and learn that they have a poorer record than Georgia, poorer in some respects than the southern Appalachian region, traditionally thought to be the bottom in American living. Many other states have some communities that are similarly poorly serviced.

During the past few years there have been increasing efforts to spread good health more equitably over the nation. One measure of good health is the presence of a county health office, with physicians, nurse, and sanitarian. The need for such care is convincing when Georgia, revealing such facts as the following, exposes equally not only her sister states but the country as a whole.

Only 170 of her 593 incorporated towns have public sewage systems, and only 41 percent of the homes are connected with those that are available

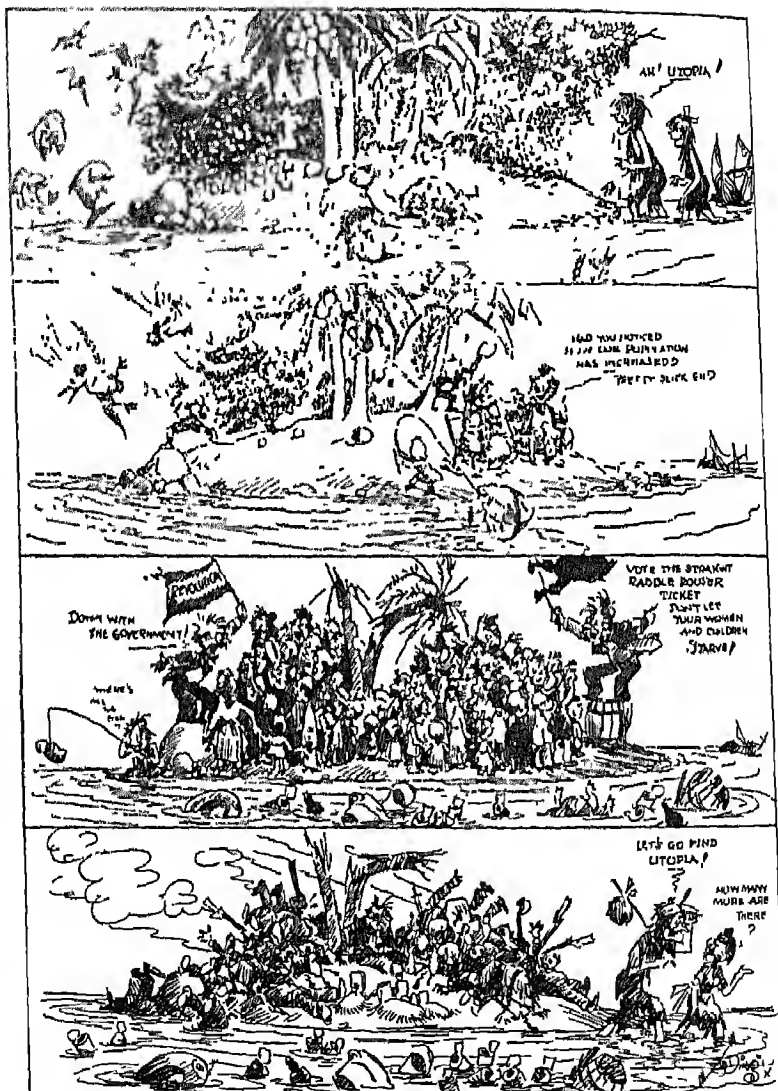
Each year she suffers from 75,000 cases of communicable diseases, 7000 of which result in death.

Three hundred thousand of her 3,000,000 citizens have syphilis, and 20,000 new cases occur annually.

One-sixth of the nation's deaths from malaria occur in Georgia. No county is free. She measures her economic loss from this disease at \$10,000 annually

Recent progress has been made in improving the milk supply, but in 1940 there was only one town in Georgia which had a milk supply on the accredited list of the U. S. Public Health Service

In 1938 over 400 mothers died in childbirth. There were 3400 still births; 4350 children died before they were twelve months old, and over 25,000 deliveries were attended by midwives. Georgia has no school of midwifery.



Courtesy Jay N Darling

The Outline
of History

All these matters come under the general assignment of the U. S. Public Health Service. Some gradual changes will come thru the service now operating, but individual counties here and there, and in only half the state, cannot solve the problem alone. Not only do we know how to treat the patient, but with one or two exceptions, we know how to wipe out all communicable diseases. We know what measures we must take to eradicate pellagra, hookworm, typhoid, syphilis. But we approach the problem with criminal indifference. Only when total war is declared on all these enemies can they be defeated.

One would imagine that exposing the facts would be the major part of the battle. If people only knew what was happening they would do something about it. Too often the truth is that telling the facts consolidates opposition. Word gets around that the citizens' committee is trying to smear the state, that if any newfangled changes are brought about they will cost more in taxes. The solution is far from simple. It is closely interwoven with the many other problems of human living, so much so that there would seem to be little gain from an attack on a single front without opening an offensive on all others. Malnutrition, disease, lack of medical care, and unsanitary conditions are directly tied to the poverty of the area. Much of the poverty is a result of maladjustments in our social and economic system. Men and women working in the field of human betterment are beginning to realize these close relationships and are beginning to appraise the forces working with them and against them.

An illustration of the complexity of the problem is seen in the struggle now going on in one southern county where the citizens are pressing hard for a public health service. At the county seat the mill owners have constantly fought progressive leadership within the ranks of labor, have driven it from the town whenever it appeared, have stifled unions with threats and paid deputies. They have depleted their workers emotionally by hiring Holy Roller preachers to encourage unnatural week-end revivals. The owners have fought labor legislation, submitting only after the threat of federal court action. When it was apparent that they would have to raise wages and lower hours in accordance with the national Wages and Hours Bill, they ran their mills on twenty-four hour shifts, built up a large surplus stock, and then shut down with a bang when the law was passed. They placed armed guards at the four main highways leading into the county and commanded them to send labor organizers back where they came from. They paid some workers to spy on their fellows. By these and other pressures they maintained a submissive labor supply.

Meanwhile, in their uptown churches, the mill owners have contributed freely to the collection plate. In at least one instance the minister has been paid directly by a mill owner. When the farmers and the mill workers of this county joined hands to demand that a public health service be established, this minister called together the other preachers in the town

and led them in a resolution to the county commissioner, urging him to stand firm against the demands of the people.

One group and only one unites the opposition. It is made up of the same class structure that has fought the people on most progressive measures since the day the first dollar of capital was invested in the county's mills. Openly and without apology, their spokesmen are now saying:

"We half dozen mill owners give you the opportunity to work in our industries. We supply you with everything you need—houses, stores, churches. We pay most of the taxes around here for the services that bring benefits to you, to the farmer, and to everyone else in the county. Why can't you be content? For ten years we have had to make one concession after another to you, to the gangsters who speak for you in organized labor. And now you come with these additional demands that we pay for your medical care. This time we will resist. We won't pay a cent more out of the earnings of our mills to bring you doctors and nurses. If your women and children are ill, pay for their care yourselves. There are enough physicians in the town. If the farmer's wife gets sick, that's his concern, not ours. Go back to your spindles and your plows. Let us worry about the affairs of the county. We know best what is good for you."

So the county commissioner, who takes his orders from the mill owners, has refused to heed the people and the county continues without a public health service.

An Education That Lives

Just as the far-sighted farm plan calls for nitrogen-building legumes in the care of soil, so a sound health plan seeks increased nutrition for its annual two-million baby crop. Furthermore, food nutrition must be accompanied by better mental, physical, and social nutrition. These in large measure are tasks assigned to our nation's schools. We pride ourselves on being the most literate country in the world, with having the largest public education system, free for all. And that is true if we are content to measure ourselves by others. Some people, however, think it not unreasonable to compare what we have with what we ought to have, with what we can afford to have—in fact, with what we cannot afford not to have. If the yardstick of measurement is an educated nation, if our goal is a country with citizens intelligent enough not to work against themselves and against their own interests, we must first face squarely the facts confronting us in presentday conditions.

Here are a few:

If in the future the southern boy or girl is to receive an education equal to the national average, the thirteen states from Maryland to Texas must spend each year an additional quarter of a billion dollars.

In 1941, during a study made of fifty-two of Mississippi's eighty-two counties, it was found that 1500 of her 3500 Negro teachers received \$25 or less a month for an average of six months.

Half of Mississippi's 6000 Negro teachers have had only high school training or less.

Few or no schools are available to the children of the estimated 350,000 migrants of California, Oregon, and Washington.

One of our states, not always the poorest in the record, permits 1500 of its schools to be housed in lodge halls, abandoned farm homes, churches, cotton pens, 2500 to stand without water facilities; 3000 without privies.

In Mississippi only 10,000 of the 110,000 youth of high school age are enrolled in high school. That these are figures for the Negro half of her population should have little bearing on the case.

Two high schools on the Chicago North Shore spend more each year educating their 5000 students than the entire state of Georgia spends on its colleges and universities, including white and Negro, junior colleges, graduate schools of law and medicine, with a total enrolment of 15,000.

The total endowments of the colleges and universities of the South are less than the combined endowments of Yale and Harvard.

The South must educate 33 1/3 percent of the nation's children with only 16 percent of the nation's school revenue.

These broad facts, dangerous if taken alone, add up in total to a single answer—the pressing demand for federal aid to education. The South recognizes its problem, spends a greater percentage of its taxable wealth on education than the North, but can meet its problem only thru national equalization. Marching hand in hand with these gains must come also a more progressive policy within our educational program. The rural school with its fifteen-minute lesson period, the high school with its lockstep system of giving back to the teacher the memorized facts of last night's homework, the five-hundred-enrolled college lecture course, and the mental muscle theory of certain academicians must break down before a realistic appraisal of a living education. This generalization, when broken down into its simplest terms, means exactly that. The opportunities offered to young people as they pass from kindergarten thru to graduate school must be determined, in the future, on the basis of the single pragmatic question, "Is our school alive?"

Too often this question is worded, "Does our school prepare for life?" This is unsound. If teachers are content merely to prepare youngsters to live and do not actually live with them, they will be as far from home plate as ever. But that, unfortunately, is too much the role of the average teacher today. Few students confuse their teachers with living, forceful personalities. It is an unusual school that drops the traditional teacher-pupil relationship and permits freedom of expression. How to build on what is now the best and where to make a start are matters of real concern to many. The answer is, right where you stand, whether you happen to be the teacher of a one-room school, the agriculture teacher in a village high school, or an instructor in a teacher-preparing institution. The leaders

inside teacher-education colleges carry the largest share of the responsibility for our educational future, just as they are more to blame than any other group for the perpetuation of a time-worn practice of failure.

Teachers in the future must not identify themselves as they do too often now with the interests of the "uptown class." For an example of what is meant, one need only visit a school in such a mill village as the one described. Here the teacher, identified with the more privileged members of the local society, meets her mill children with the detached manner of one who handles a problem objectively. If she is not deliberately unsympathetic, she will at best perform her task with the charitable manner of a missionary come to serve. She thinks and speaks of her wards with paternalistic feelings similar to those of the mill-owning class she comes from or aspires to. She weighs, washes, and begs clothes for her little charges, but she never takes sides in the community unless it is during a strike or in some controversy over labor conditions. Then she will be found on the side of the owner. In such a situation it is a rare teacher in the mill town who goes to the mill church, who helps to organize a parent-teacher group, who identifies herself thru such intimacies as going to supper in the homes of her pupils. And the tragedy of the whole affair is that should this identification become her natural way of living she would soon be thought "responsible for subversive elements growing up in the community," and as likely as not be asked to resign. Therefore, being by training, if not by nature, a timid soul, she finally indoctrinates her students against the life of their surroundings until she measures her success in terms of the number of dissatisfied young people she has helped to leave for better parts. Whether it is in the city, in the mill town, or in the rural village, the teacher of tomorrow, if she is worth her salt, will measure her opportunities against the welfare of the whole community.

Other Problems for Human Conservation

Health and education are the two most apparent areas of human conservation. There are others. Safety in factory, field, and on the street are closely tied to health. Recreation, a place to play and room to grow in are closely tied to education. Employment and a livelihood, in fact every phase of human living, help either to conserve or deplete our growth as a people. The homes we live in, the clubs we belong to, the feeling we have about members of another racial group, our social security laws, what we do about crime, our concern for civil liberties, our ignorance of the forces motivating those who represent us in Congress, our indifference to the rights of millions of disenfranchised citizens, our willingness to examine the race and class pressures exercised upon us daily—these are some of the elements that make up the structure of human welfare. Every man will examine them for himself if he wants to be anything more than a

mushroom growing in a cellar. Every teacher will explore them with her students unless she suffers from pedagogic encephalitis.

The main idea, then, is this: Pile all the nation's material assets into one lump, and overwhelmingly the potential of our human resources is still the greater. During the past ten years we have grown increasingly aware of this. We have whipped down the opposition of vested interests to spread more widely the benefits of science. We have established agencies of social welfare and backed them up by Supreme Court decisions. We have brought ownership to farm families, higher wages to industry, and apoplexy to the prominent club man in his easy chair. But actually we have only begun. Some see in the efforts of the past decade not so much the results of measurable change as an important reversal of attitude. If this proves to be true, then perhaps we may be on our way. The fact remains, however, that in large sections of our land we still treat our crops and livestock better than we treat our people. Our barns are still more important than our homes, our factories than our schools. In many respects we have not yet learned the basic lessons of human conservation, and the irony of it is that those regions producing the largest number of children are the ones where living is at its lowest. Yet from these ill-favored regions a million young men and women pour annually into our urban centers. To meet the problems of human welfare squarely the farmer on the land and the workman in the city should join forces in a demand for equal opportunity over the nation as a whole. Socially minded teachers can do much to help prepare the way for the type of cooperation that will bring results.¹

HUMAN RESOURCES IN THE SCHOOL PROGRAM

A Group of Teachers²

That some teachers are aware of the nation's serious need for better development, mentally, physically, and economically, for more and more of its people is evident in many school programs. Our main problems of human welfare are health, safety, citizenship and government, employ-

¹The facts in this article are from the following sources: ¶Pamphlets, Citizens' Fact Finding Movement 411 Forsyth Building, Atlanta, Georgia. ¶The Report on Economic Conditions of the South Prepared for the President of the United States by the National Emergency Council, June 22, 1938. ¶Reports on migratory problems in California U. S. Farm Security Administration. ¶General reports on migratory problems made by the U. S. Farm Security Administration. ¶Studies made by the author for the U. S. Farm Security Administration. Independent study and observation by the author. ¶A survey made by fifty-two Jeanes teachers in the state of Mississippi and submitted to Florence Alexander, state Jeanes teacher, Jackson College, Jackson, Mississippi. ¶Report by P. H. Eason, Negro agent, state department of education, Jackson, Mississippi. ¶Tax study made and published by the state of Illinois, 1936.

²Loretta Freeborn, North Creek, New York, Leone Davison, Zumbro Falls, Minnesota; Mary Bathurst, Dighton, Kansas, Wayne Lovely, Greenfield, Iowa, Florence Jenkins, Chatham, New York, Henry Wallace, Zena, Oklahoma, Pearl Hill, Warren County, New Jersey.

ment and a healthier, housing, education, recreation, and self-improvement and culture. It is true that these problems cannot be totally met by the school. When children are poorly nourished, the school can serve a midday meal, but it cannot serve breakfast and supper; and it cannot secure for economically displaced families the income with which to buy all the nourishing food they need. It can usually prevail upon the school board to provide a source of good drinking water for the school, but it cannot dig safe wells for the homes. It cannot increase the number of trained doctors, cannot improve the housing for that third of our nation that is said to be poorly housed.

Even if it were desirable, and usually it is not desirable, the young rural teacher in her short term cannot transform the ways of living of the generation that constitutes the mothers and the fathers of her pupils. But in any community the teacher and parents can and should cooperate in the solution of community problems and especially in the development of a new generation of citizens who will understand their own problems and the nation's problems and be actively receptive to new ways of living and to a changing national economy—more and more able to cope with the problems that threaten the nation's human resources. Beginning in the elementary school, children's studies can be so related to their lives that the foundation is laid for a future rural community that will understand and be able to secure the channels thru which better rural living can be achieved.

It is the purpose of this article to point out some of the school and community activities that have been developed in the conservation of human resources when the school or community has needed such work. A list of activities was compiled from reports of teachers and courses of study in health and the social studies. This list was checked by several teachers to indicate the items which are included in their school programs. The outline that follows includes the major problems and items. It does not represent any particular program, but merely gives suggestions for use in developing programs.

1. *How can boys and girls and grown-ups conserve their personal health?*

Teacher and children discuss needs that arise and plan ways for meeting them in school or home: Are our school and homes so arranged that we can have the best light for study, reading, or close work? How can we improve them? What can we do to have a year free from colds? What have rest and recreation to do with health? Cleanliness and sanitation? Orderly and attractive surroundings? Protection from flies and other harmful insects? Habits of keeping busy when not feeling happy, and of trying to think pleasant thoughts?

Programs of improvement Search for the information needed. School health schedule worked out by teachers and pupils together, including periods of rest and play, staying at home when sick, tacking mosquito netting

on windows when screens are not available, making schoolroom attractive, planning interesting conversation for the lunch period, having a hot lunch at noon, having many interesting things to do when work is done. Height and weight records.

2 *What can we do about the health facilities of our community?*

Discussion of needs and problems: Are there laws that we should observe carefully, such as quarantine laws or laws or rules regarding vaccination and inoculation, that protect the health of the entire community? What are the rules for the care of milk sold in the community and what can individuals do when these rules are not followed? Does the community need a pasteurizing plant? A cold storage food locker? How might the people secure either? Where can we get the information we need?

Is there a hospital accessible to the people of the community? What do we need to learn about it? If there is no hospital, what can the people do in normal times to secure one or to secure hospital services elsewhere? What do nurses do for people? How many nurses are there who serve our community? How many doctors? How many people for each doctor?

How do most of the families get their drinking water? What health regulations should be observed to have the water pure enough to drink? Where should wells be placed in relation to other farm buildings? How deep should they be?

What are some of the safety hazards in school and homes? Are there any that boys and girls can remove?

Programs of improvement. The class or a committee and teacher plan a trip to a hospital; arrange to talk with a doctor, an intern, a nurse, a patient who is well enough to see them; visit a sunroom. Pupils send flowers or cards to people in the community who are ill. If the community is promoting a campaign for a hospital, a clinic, or other health services, the teacher and children arrange to take part by distributing posters, announcements, and other information, and by writing articles for the school newspaper, making posters, and searching for information which is needed to answer questions which people raise regarding the project. Children figure costs of screening their homes and compare with the cost and durability of mosquito netting. Teacher and pupils carry out a program of accident prevention on the playground. Pupils and teacher incorporate the necessary safety precautions into their programs of work and play for home and school.

3 *How can we improve and make better use of our government?*

Our school club, young citizens' league, or young American club. Is our club a democratic organization? What makes it so? How is our school improved by having a club which is really democratic? What services and pleasures do we have thru the club, such as hot lunch, attractive school grounds, school safety or highway patrol, letters and cards to those of us who get sick? What plan or program can our club adopt to increase its usefulness? What services does our community have thru state and federal government?

School activities connected with government and citizenship: Pupils and teacher make a study of the government services in the community and interview the officers in charge, such as the county superintendent of schools, the county nurse, the county agent, the 4-H Club agent, the county road supervisor, inspectors of dairy farms, inspectors of homes being bought thru the Farm Security Administration.

Arrangements are made to use more of the government services that have promise of usefulness for the school, such as the help of the county agent and the county agricultural office, the 4-H Club agent, and government bulletins. Pupils and teacher organize a schoolboy traffic patrol

4. *How well are the people of our community independently employed?*

Discussion What are the advantages to a community in having enough industries so that all people can have satisfying work at all times? To a nation? What are the harmful effects of made-up jobs to community and individuals? Has our community work for all its people when there is no outside stimulation such as war? Are there any new industries that might be started? What percent of the young people go out of the community to find jobs? What is the average income in the community? How does this compare with incomes in other occupations? What can farmers do to increase their income thru cooperation?

Activities. Pupils and teacher plan a questionnaire to guide their survey of occupations in the community. A canning factory, a sawmill, or some other industry in the neighborhood that employs many people is visited to find out what the workers do, what percentage of the community are employed there, how many months they work each year, and what they do the rest of the time, where they live. Findings are discussed.

Resources of the community that warrant the establishment of new industries are explored and discussed Are there any natural resources, such as lumber, minerals, oil, that are not being used? Could an industry in handicrafts be established? Can cooperative buying or selling or rural credit unions be established to increase income or lessen expenses? The county superintendent is invited to take part in the discussion.

5. *Are the people in our community well housed? The people of the nation?*

Study and discussion Features of adequate housing, such as facilities for cleanliness and sanitation, warmth, screens, rooms enough for comfort and privacy for all the family, closet space, additional storage space, grassy lawn, walks, attractive trees and shrubs

Reasons why some rural housing is inadequate Income from many farms in so-called normal times is too small to pay for better housing. Farm income is usually uncertain. Farmers face possible crop failures because of bad weather, attacks of insects, shortage of farm help. Worse conditions are in regions of poor soil.

Improvement to be had without additional income Homemade closets, cabinets, and wardrobes. Inexpensive wallpaper put on by members of the family. Curtains made of figured feed bags. Tools, utensils, and furnishings kept clean and in order. Flowers and shrubs.

Activities: With cooperation of parents, pupils paint, paper, or decorate their own rooms at home. They make cabinets for storage space, practice keeping kitchen, living room, and bedrooms in order. They plant flowers and set out trees and plants to make the yard attractive. As a means of planning their activities they secure magazines, bulletins, and catalogs and look at pictures of attractive homes, farmsteads, and rooms.

6. *What are some of the ways of getting an education in our community?*

Study and discussion: The advantages of being educated. The value of different school subjects. Are we making full use of the advantages we have? Are we improving in reading and arithmetic? Our understanding of our community problems and other social problems?

How our school is maintained: How is the money supplied? Do we get money from the state for our school? For books and equipment or anything else? Where does the state money come from? How does this give children in all parts of the state a more nearly equal chance at education, even when some communities are so poor that they could not afford all the advantages themselves? It is right that communities that have rich farms and factories and other property should be taxed for the schools in communities that do not have such wealth to tax? Should schools receive money from federal taxation?

Activities: Teacher and children organize a school cooperative to purchase supplies, make a picture or bulletin collection that all the school can use, have a book exchange in connection with a program of reading improvement.

Pupils talk with older students and learn what is studied in other grades and high school. Pupils interview high-school teachers to learn what courses prepare children for jobs in their community and elsewhere, and discuss their findings in class. Pupils discuss the advantages of high-school education.

Pupils make a survey of the community to learn what agencies in the community besides the school help them improve their education and in what ways these agencies help, such as the 4-H Club, churches, library, parks, museums, county fairs, radio. They plan how to make more use of their educational opportunities.

7. *In what ways can recreation and leisure time be regarded as resources?*

Discussion: The value of well-planned leisure and recreation in the improvement of health. The importance of making recreation a habit. The kinds of recreation available in the local community.

Activities: A cooperative program of playground improvement. Organization of a committee on games and toys for use at home. A study of community recreation including a list of the kinds of recreation possible in the community, such as parties, folk dances, picnics, celebrations and festivals, fairs, swimming, skating, coasting, skiing, horseback riding, radio, library, hobbies, handicrafts. The school's initiation of a new kind of recreation, such as community picnic place, a community skating pond or roller-skating rink, a farmers' festival.

- 8 *What resources does our community have for self-improvement and culture? Do we make all possible use of these?*

Discussion. Children make a list of the resources they know about, such as a town or county library, handicrafts, music, museums and local relics, history, and ways of learning about the culture of other communities and nations.

Activities. Arrangements are made for individuals or families to have library cards in nearby libraries and for each child to have the experience of asking for and selecting books. Children work with a committee of parents to develop a community library or bookshelf. Organize a handicraft activity, such as quilting, rug weaving, or woodworking, with a committee of parents in charge. Make a survey of the American music which is known in the community. Make a collection of old sayings and tall tales that belong to the community. Write the history of the home community. Arrange for an exhibit of historical relics from the community.

COMMUNITY SCHOOLS IMPROVE HUMAN RESOURCES

The following excerpts from reports of principals and supervisors are evidence that real rural community schools are raising standards of life and improving human resources even where many family incomes are low.

HUBBERTVILLE TRIES COOPERATION

May Landers Adams and R. W. Hollingsworth

Hubbertville, a rural community located in an upland agricultural section of Fayette County, Alabama, covers an area of 250 square miles. The school, the geographical center of the community, is twelve miles from the nearest town. There is no industry except a few portable saw-mills. The two principal occupations are lumbering and farming. The average annual cash income does not exceed \$500 per family, from 1931-41 it was around \$300. There is only one general store. To take the place of the old sixteen-room frame building which burned in 1939, a new community schoolhouse valued at \$100,000 has just been completed, paid for by insurance on the old building, cash donations, WPA funds, contributions of labor by patrons and pupils, and a small capital outlay by the board of education. This new building has no outstanding indebtedness.

Because of the low income among the families, housing in the community has not reached as high a standard as the people desire. Only a few new houses have been built, but, thru the influence of the school, almost every home has made some improvements. Among these are the following: the addition of rooms and windows; the remodeling of floor and roof spaces; the papering of walls; the painting of interiors and exteriors; the installation of electricity, and the purchasing, rearranging, re-

finishing, and construction of furniture. Probably the project that has added most materially to the community was that of securing electricity.

The only form of artificial lighting used in the community before 1940 was that of oil and gasoline lamps. These were used not only in homes but also in all public meeting places. The people realized the need for better lighting. Early in the year a group of representative citizens met with officials of the power company and found out steps necessary for bringing an electric line to the community. A survey was made. Later, a mass meeting was called at the school and plans were made for an extension of an electric line which would serve the community.

It was necessary for four people to sign contracts for each mile of line. Members of the school faculty and a few students visited every home on the proposed route. Eighty-two contracts were signed and 14.2 miles of line were built. Later seven miles of line were added to serve forty-five more families.

Before this time only ten of the three hundred families represented in the school had electricity in their homes. Now almost 50 percent of the houses have electricity. Many electric appliances have been bought. Twenty refrigerators, thirty-five irons, forty radios, four stoves, two electric sewing machines, and one washing machine have been bought. This number would have been greater had it not been for the fact that people who had bought radios operated by batteries, kerosene refrigerators, or other non-electric appliances were not financially able to make the exchange. Many families have bought less expensive labor-saving devices.

No physician or dentist lives in the Hubbertville community. It is twelve miles to the nearest town in which one lives. The fee for medical services is based on mileage—two dollars for the first mile and fifty cents for each additional mile.

In 1937 Fayette County had a health unit for the first time. The school and community have made every effort to make maximum use of it. When the health officer comes to the school for routine examinations, mothers are urged to come and talk over their problems with him. Pre-school, typhoid, and diphtheria clinics are held each summer. Ninety percent of the families have come to take immunization measures.

Recently a dentist sent by the state health department examined the teeth of 210 elementary-school children. Only fifteen had perfect teeth. Five had fillings. No child below the fourth grade had been to a dentist. Parents, teachers, and children are planning ways and means for taking all those who need dental care to a dentist during the school year.

Thru such home-school projects as those described, the community is beginning to realize the benefits to be derived from planning and working together for the common good.

Edward Yeomans, Jr

A sweet potato curing house is an insulated frame building, equipped with a furnace, in which raw sweet potatoes are placed to ripen. Carroll County, Georgia, produces sweet potatoes for home use, but most people pile them in a hill of earth for curing. The losses from rot will run from 10 percent to 100 percent, depending on weather conditions, and even the best ones will not keep long after they are removed from the hill.

The people of Smyrna community, holding meetings once a month in the three-room school, became interested in building a curing house in order to save the potato crop. The question was discussed at length, costs were estimated, and a cooperative association was formed and incorporated. But most people were discouraged. The building would cost \$700, which is big money in a section where the annual cash income is \$300 per average family.

Then the school principal stepped in. She took her sixth and seventh grades to visit a curing house. The children saw a finished building and another that was being built. They got the dimensions, saw each layer of insulation, heard the cost of building and operating, and learned how the temperature and humidity have to be controlled during the process.

A report was prepared for the next meeting. Plans furnished by the extension department were scaled up to poster size. Information on dietary values of sweet potatoes was obtained from the home demonstration agent. The material collected on the trip was organized for presentation. Samples of hill-cured and house-cured potatoes were collected for a taste test. A curing-house owner was invited to speak.

The night of the meeting the schoolhouse was filled. The president of the cooperative association opened the meeting and introduced the children. As their collection of information was shared with the adults, interest grew visibly. The curing-house owner was questioned. The samples were tasted. The scale drawings were discussed.

When the vote was taken a majority wished to build the house at once, and subscribed for \$115 in stock at \$2.50 a share. Four weeks later, when the next meeting was held, the secretary reported that the house had been built, that it was full to capacity, that over \$200 had been collected in stock, and that a loan had been made for the balance which would be repaid in a year. People said among themselves that the school had done the community a real service.

Tallapoosa School, also in Carroll County, is another three-room country school. Student-teachers from West Georgia College live in the community and work in the school under the direction of the principal.

In a county having no public health facilities and where a doctor is

usually called as a last resort when all other remedies have failed, food is the best guarantee of health. Every family has a kitchen garden but not every family has the equipment to can vegetables for winter use. The community, in meetings at the school, decided to build their own canning plant.

It took six months of study and planning to incorporate an association, locate equipment, visit other canneries, and raise the \$500 necessary to begin. A building was bought, sawed in half, and hauled in two pieces to the site. Second-hand equipment was found in a nearby plant which had been closed. One hundred and twenty-five people bought at least one share at \$2.50. A water pump was installed to serve both the school and the cannery.

When the plant finally opened, the season was well advanced, but nevertheless, 10,000 cans were put up for winter use. The following summer was better and the treasurer reported at the meeting in December that 36,000 cans of fruit, vegetables, and meats had been prepared in the cannery. Most of this food went into homes but some of it was sold for a good profit.

Corn meal is a staple, not only for people but for hogs, cattle, and chickens as well. When the privately owned corn mill was moved from the community, the people decided to instal their own. More stock was sold, a building was donated, and equipment was bought and installed. A sign above the door reads

Tallapoosa Cooperative Mill

The farmers of this community have paid for many mills

This is one they really own

Other communities have been led into similar projects by their schools. Burwell has a lunchroom, a five-acre garden, and a cannery. Sand Hill has a lunchroom and a cannery. Smithfield is planning a prepaid veterinary service. Hulett is planning to buy a tractor and combine.

Films are shown at meetings. Men, women, and children attend and take part in singing games after the discussion. Sometimes refreshments are served; occasionally a play is given. Recreation and business go together, young people and adults contributing equally.

The directors of the various community associations have formed a county cooperative association. Last summer they marketed \$1600 worth of fresh vegetables together by hauling them to Atlanta. Now they are beginning to purchase farm supplies cooperatively. A credit union organized by the teachers of the county has been duplicated by the employees of a cotton mill.

The communities are studying dehydration and hope to instal at least one dehydrator for use when cans are scarce. They wish to buy farm

machinery cooperatively to make up for farm labor shortage. They expect to grow more food crops for their own use and for market. Above all, they are beginning to realize that many of our so-called national problems have roots in communities like theirs, and they are building new concepts of democracy thru self-help.

COOPERATIVE SCHOOL PROGRAMS

Juliet R. Ware

In a group of schools in Virginia, the teachers of the elementary schools and the teachers of home economics and agriculture in the high school planned their work cooperatively so that for three or four hours each week the children of the elementary school might have the benefit of guidance from teachers especially trained for vocational instruction. Following are some of the school and home activities that resulted:

1. Survey and study of home and community life with regard to the economic status of the family, homemaking practices, housing facilities, gardening.
2. Unit on better gardens in elementary grades. Study of foods.
3. Preparation of Christmas candies and cookies.
4. Bats for games made in agriculture shop.
5. Preparation and serving of foods.
6. Study and construction of garments.
7. Decoration of lunchroom.
8. Learning to be hosts and hostesses for lunchroom.
9. Building workbenches for classrooms.
10. Making window curtains for classrooms.
11. Inviting parents to school to observe class at work on diet and to participate in discussions.
12. Surveying community to find recreational centers and types of recreation in the homes.
13. Learning songs and games for recreation at school and at home.
14. Making dresses, tea towels, and scarfs at home and at school.
15. Keeping schoolrooms and homes more attractive.
16. Canning fruits and vegetables.
17. Planting and caring for vegetables and flower gardens at school and at home.
18. Changing back office into a kitchen, a back hall into a bedroom; making and keeping each classroom attractive, improving personal appearance.

CONSERVATION MEANS BETTER RURAL LIVING

Henry Wallace

There can be no real barrier between conservation of the natural resources and conservation of human resources because the one is the result of the other. In Zena, Oklahoma, for example, the school-community con-

ervation program has resulted in a definite rise in standards of living, and that without the introduction of new resources or fundamental changes in rural economic policies. The program began with the teachers' and pupils' survey of the community history and resources, both natural and human—a study which rather startlingly showed that the resources of the community were being wasted and destroyed thru careless practices in farm and home management.

The Pupils Survey Their Community

The following summary of the survey findings was compiled from information gathered and recorded by the pupils. Numerical data were placed on three- by five-inch cards for the various families in the community and filed alphabetically.

The Zena community is relatively young. Sixty years ago the land now comprising the Zena school district was inhabited by the Cherokee Indians. It was not until 1892 that white people moved from the state of Arkansas to lease or rent the land from the Indians here. The Indians were not farmers. They let nature assist them to make their meager living, and when the white people came to this locality they found virgin forests of oak, hickory, pine, cedar, walnut, and other species. They also found some very desirable looking land hidden beneath this forest region. Too, they found an abundance of clear streams to encourage them to invest immediately in the livestock business. These newcomers to the Indian country went thru the forests clearing them and sowing the soil to crops to provide winter feed for their animals.

They soon began purchasing small tracts of land from the Indians and before very long then Indian friends were pushed to the southern part of the school district, where a few of the families still reside. The new farmers used the best timber for fences and buildings about their farms. They burned the remainder of the woodland to make room for their agricultural products. The clearing of the forest lands and the planting of row crops each year caused the land to wash badly, resulting in accelerated soil erosion. Each spring the farmers habitually burned what woodlands were left to rid them of ticks and insects, and this continual burning caused the timber to die young or to become very poor in quality.

Today, in the community served by the Zena School, there are seventy families. Of these, 90 percent own their farms and the remaining 10 percent are renters. Livestock raising is the main industry, supplemented by tie-cutting and lumbering now and then as convenient, and by the raising of farm crops, such as wheat, corn, oats, tame pasture grasses, grain sorghums, truck crops, and fruit.

The farms range from ten acres to two-hundred acres in size. The average is about eighty acres. About 60 percent of the farmers have good pastures of tame grass, which is practically enough to support their cattle the

year round, about 75 percent of them still use the range because the grass out there is exceptionally good and there is plenty of water. The people work together in looking after one another's cattle on the range. The plan is effective and profitable.

The livestock consists mostly of beef cattle, altho several farmers have dairy cows and sell cream to the creameries at nearby towns, and others have sheep and goats. Nearly every farmer has a few hogs.

Most of the truck crops are consumed at home, altho berries and vegetables are marketed. The aim of most farmers in these small crops is mainly to raise enough feed for their stock and food for their families the year round. Practically every family has poultry, mostly chickens, and the eggs are marketed.

The Zena School has two teachers. Fifty-one pupils are enrolled. It is not a *teacher* school, or even a *teacher-pupil* school, only, but a *community* school, which is organized to serve educationally the life and needs of the community and in turn to be served and supported by the community. The school does not patronize or attempt to reform the district, but tries to help the children grow in being citizens in a community that is itself growing, economically, culturally, and spiritually.

To meet the needs of the community, for example, for two years the school has opened the first Monday in August in order that the pupils might get thru the nine months by the middle of April in time to assist with the planting of the spring crops. The pupils also help with the summer harvest. In this way young people grow up with a fine feeling of responsibility for making farming a good way of living. To offset the danger of "all work and no play," attempts are made by the school and 4-H Clubs to add meaning and interest to the farm work which the children do and to provide recreation by encouraging hobbies, parties, and plenty of play in and out of school. Altho there is fall harvesting to be done after the opening of school, few of the children have to miss school for this. Last year the pupil attendance for the nine months was 95.5 percent. The pupils walk from one-fourth to three miles to school each morning and the same distance home at the end of the day.

In serving the school, the community is unusually alert and cooperative. As their contribution to the school lunch parents and children at home have canned twenty-five quarts of fruit and vegetables for each child they have in school. Last year the average number of visits from parents was nine per week. This year, in less than a month of school, there have been visits from sixty-four parents lasting from two hours to all day. They come to school to help and to see how the work and progress of their children compare with those of other children. Each Christmas the school, church and community sponsor a Christmas tree and program. Last year ninety parents comprising fourteen committees served, and not one failed to perform his job.

Conservation Needs Are Revealed

Thru this study of the community, problems of conservation were brought strongly to our attention. The pupils found that the tie-cutters, who are chiefly Indians, can scarcely find timber with which to make crossties. The Indians themselves say that they make only 20 percent as many crossties today as they did ten years ago because good timber is hard to find. The farmers, too, are complaining about the shortage of timber with which to make the posts to which their wire fencing is attached. Wild cherry, cedar, and locust timber are being replaced with a poorer grade of white oaks at twice the price because of the shortage of good trees. The local sawmill operator told a group of 4-H Club members that native timber is the poorest today that he can remember, and he has been sawing native lumber for consumer purposes for twelve years. Yet the farmers' low incomes do not permit them to buy steel posts for their fences. The pupils also found that the people in the community that wanted to do any building were practically forced to buy expensive lumber from the lumber yards, or to use native stone, if they wanted to build a good building.

The pupils have learned thru field trips with the county agent and their teachers that the soils in the community are badly eroded. They have noticed that crop production is continually decreasing on their own farms. The pupils noticed gullies of different sizes on most of the farms visited, but the county agent told them that they could not see the most dangerous kind of erosion, that of sheet and wind erosion, thru which small layers of the soil are taken until the most valuable part of the soil is gone before the farmer actually misses it.

The field trips also taught the pupils that many of the farms suffered from water shortage for livestock purposes. They soon learned that this was the reason for the "open range" system in use today thru which the farmers could turn their livestock into the open and let them graze and hunt water.

The visits to the farm homes showed that many did not have cellars, smoke-houses, or vegetable storage bins in which to store food for the winter months. People from the community were invited to the school and they told the boys and girls that many people today do not store food for winter because they can buy what they want at any time from the local stores. They also told the pupils that the common practice today is to market the products as soon as they are harvested. Apparently few had considered the money that might be saved by producing food at home.

Conservation Program for the Woodlands

The pupils decided they could help with the problems that were so prominent within their community. They are doing many things today toward a substantial forest program. They have educational talks and

pictures to show the need for preventing and stopping the annual burning of our woodlands. This practice is fast decreasing. The pupils have encouraged one young farmer to plant one thousand catalpa trees for future post timber. With the help of the school and the county agent, these posts were purchased from the state forestry division at a very small cost. The boys and girls get bulletins from the county agent, the state agricultural college, the state forestry service, and from the U. S. Department of Agriculture to give and lend to the farmers interested in protecting the woodlands. They write stories and timely topics about the value of the forest lands and the need for protecting them. They write and present team demonstrations on the best kind of timber to select for making posts and on showing the damage done thru burning the forest lands. They also write weekly news articles to the county papers praising the work of those farmers who are doing outstanding work in protecting our timber resources.

Conserving the Farm Land

The 4-H Club has three terracing teams that compete in the annual terracing contests held in the county. These teams always make a good showing because of the interest they have in the terracing program. There are more than 150 acres of terraced farmland in the Zena community and every farmer who has the terraces is proud of them. They can now see the water that the terraces hold for the soil and can also see actual evidence of the soil that remains above the terraced ridges after each rain. Other farmers are considering the building of terraces. Only a few weeks ago the 4-H Club members helped the county agent survey some terrace lines for a farmer. Over 60 percent of the remaining crop land in the community is planted to tame pastures that provide grass for the farmer's livestock thruout the year. The farmers have discovered that the pasture grasses hold the soil and furnish the cheapest form of feed for their livestock. Over 50 percent of the local farmers cooperate with the federal government in the program of soil building. When the farmers meet at the school to discuss better soil-building practices, the pupils are excused from classes to attend. These father-son discussions have always been worthwhile.

Building Farm Ponds

The boys in the 4-H Club wanted to do something about the shortage of water for the livestock on many of the farms. They wrote the county agent for bulletins describing farm ponds and distributed these to the farmers of the community. The farmers became interested and cooperated with the county agent and the county commissioner in getting machinery into the community to build farm ponds. Today, twelve farms have ponds

that hold sufficient water to meet the needs of the farmers. Most of the farmers now keep their livestock on tame pastures where they have an abundance of feed and water and do not risk losing them by turning them on the open range. This has also caused the farmers to take more pride in their fences and they keep them in good shape now

The Farm Family Food Supply Program

The Zena School sponsored the Farm Family Food Supply Program for the county agent's office during March. This program planned to get every farm family to produce three-fourths of the family food at home. The pupils worked one week with the committee and forty-seven of the seventy families signed pledges to cooperate. The plan is working and more farm families are preserving and storing food than at any time during the past ten years. This is truly a live-at-home program. The cooperating farm families receive bulletins at regular intervals from the county agent's office to assist them in getting greater production by properly fertilizing the soil, destroying the insects, and skilfully harvesting the crops produced.

The Program Carries On

The conservation program of the Zena School will continue to serve the community because practically every farmer is aware of the need. During the past four years the school pupils have developed the following activities

1. Maintaining an up-to-date conservation library
2. Learning the state game laws and studying the life history of protected wildlife to see the reason for the laws.
3. Practicing fire control, especially on camping trips.
4. Learning the part that various departments of the state and national government play in conservation.
5. Discussing farmer-sportsman relationships.
6. Building birdhouses and feeding stations for the birds.
7. Studying the value of birds to the farmers of the community
8. Learning to identify the useful and harmful kinds of insects found in the community, and learning how to control harmful insects.
9. Learning to identify trees
10. Learning the names, location, and quantity of wild flowers found in the community.
11. Learning to appreciate the beauty and fragrance of wild flowers without gathering them.
12. Transplanting native shrubbery on the school lawn and on home farm lawns.
13. Learning to identify the noxious weeds. Knowing the weeds that can be used as food. Knowing weed seeds from seed grains.

14. Assisting to control erosion by filling gullies with rocks, loose straw, and so forth, by planting tame pasture grasses, and by using terraces
15. Helping parents to preserve food for winter's use
16. Making a potato storage bin for farm use
17. Learning how to butcher hogs and to cure meat for winter's use
18. Keeping the school lawn mowed, the trees whitewashed, and the toilets in sanitary condition thruout the year and not just during the regular school months.

Pupils "Think Conservation"

An article from one of the pupils shows the earnestness with which conservation of the community's resources is regarded

We should consider the soil of our farm, because our government depends on us for food and clothing. Alfalfa or other legume crops can be planted to add nitrogen to the soil and make it fertile

Terracing saves the top layer of the soil. Only five percent of the soil contains plant food I live on a farm that has 30 acres of terraced land Terracing helps save the soil in many ways (1) They keep it from washing, (2) they stop sheet erosion, (3) they stop gulley erosion Don't let your farm wash away "Terrace it"—*Bobby Lee Stevens*.

CHAPTER V

Summary and Sources of Information

Charles N. Elliott

THE OUTLOOK FOR CONSERVATION EDUCATION¹

FOR MORE THAN A QUARTER OF A CENTURY schools here and there have realized how important it is that children be taught the significance of a wise use of the natural and human resources, and have provided instruction in conservation. In recent years this interest in conservation education has broadened.² In June 1937 a group of leaders in conservation and conservation education gathered in Washington at the request of the commissioner of education, John W. Studebaker, to discuss the need for a program of conservation education that would be nationwide in its scope and effectiveness. At this conference it was agreed that such a program is desirable and that it should involve (1) detailed and continuous search for truth on the part of the nation's scholars; (2) presentation of the facts discovered in such a way that laymen—both adults and children—can understand them, (3) preparation of teachers, and (4) expert guidance of learners in their participation in solving the problems. To this end, the group agreed, the efforts of the various agencies and organizations working to further the cause of conservation education should be coordinated.³

Since that group made its recommendations, teachers, school administrators, conservation agencies, commissions, and organizations have continued their attempts to arouse a conservation consciousness in the United States. It is true that the nation's outstanding needs for conservation have not been met. Desired objectives have not been achieved. As Mr. DeBorja points out in Chapter I, lapses, selfishness, ignorance, halfheartedness, and failures have marked the efforts of many from whom real accomplishments have rightfully been expected. Applying certain words of Winston Churchill to the conservation education situation, we might say that we have not reached the end of our goals nor even the beginning of the end. We

¹The section on "The Outlook for Conservation Education" is a summary given by the editor.

²See William H. Bristow and Katherine M. Cook, *Conservation in the Future*, U. S. Dept. of the Interior Bulletin 1937, No. 4, available from the Government Printing Office, Washington, D. C. This bulletin gives an overview of progress in introducing conservation into the school program and describes instructional practices that have been successfully followed.

³U. S. Department of the Interior, Office of Education Report No. 5112, Washington, D. C., the Department, 9 p. (Mimeo.)



Courtesy Jay N Darling

*The Conservation Interests
Can Get What They Need
if They Will Pull Together*

have some justification perhaps for saying that we are approaching the end of the beginning.

The nation's scientists daily are discovering more of the truth about our resources and about the type of utilization that is in harmony with continuously rising standards of civilization. As a glance at the bibliography reveals, writers and publishers, interpreting the truths discovered, have given us delightful books for children and helpful publications for adults, so that no longer does the person who can read have any excuse for not knowing how significant to the welfare of the nation are the wise use and replenishment of our natural resources. In Chapter II Mr. Palmer presents in useful statements specific illustrations of what teachers and children need to learn. Some spread in conservation consciousness is shown by the studies mentioned by Mr. Palmer on pages 32 and 33. Most significant educationally, perhaps, are the implications of Chapter III, showing that many schools are providing conservation education which functions more and more in the lives of boys and girls, our future citizens. Not just "to learn about conservation," not just "to study the natural resources," not just "to perform classroom experiments," are the children's goals in the reported activities, but actual conservation in their homes and communities, and increased background and ability to think thru the national and world implications of conservation problems which they are helping in their small way to solve.

What is the outlook for the nation? Will the United States continue to neglect her resources or will the citizens of tomorrow conserve? Can we look forward to a unified, effective program of nationwide conservation education? Teachers can determine the answers to these questions. They can help unify the contributions of various agencies to the education program. They can prepare a generation of citizens who thru their votes, influence, and example will bring about a utilization of the nation's resources that will result in the maximum advancement of the human race. Because of their close contacts with their communities, rural teachers have an especially significant contribution to make.

BIBLIOGRAPHY⁴

A bibliography is presented here with the idea of giving examples of types of publications that will prove useful in the study of conservation of the natural resources. For helping pupils understand the conservation of human life, strength, and culture, many rural teachers are using texts and supplementary books in the social studies, health, and natural sciences, and for their own reading, such publications as those of

⁴For assistance in securing and checking bibliographical detail, the author is indebted to Anna Clark Kennedy, senior supervisor of school libraries, and to Ruth Evans Babcock, assistant supervisor of school libraries, New York State Education Department, Albany.

Paul De Kruif, David Cushman Coyle, Bertram Fowler, E. Franklin Frazier, Liston Pope, Arthur Raper, Paul B. Sears, Elsie Clapp, Kate V. Wofford, Fannie W. Dunn, Frank W. Cyr, and Iman E. Schatzmann. We regret that it is impossible to include in this brief publication more of the excellent books and bulletins now available. In order that teachers who desire additional materials may know where to get them, other bibliographies are listed on page 113. Inexpensive bibliographies can be secured from state and federal government agencies. Most textbooks and reference books on conservation contain bibliographies. Librarians are prepared to advise and help secure materials.

GENERAL REFERENCES

Books for Pupils and Classroom

BRUNER, HERBERT B., and SMITH, MABEL C. *Conserving Our Natural Resources*. New York: Charles E. Merrill Co., 1938. 136 p.

General and well-written story of our natural resources. Simple enough for elementary grades. Treats several specific resources, such as coal, oil, forests, soil, but omits others, such as wildlife and water. Interesting problems at the end of each chapter.

BUTLER, OVID. *American Conservation in Picture and Story*. Washington, D. C.: American Forestry Association, 1941. 144 p.

If according to an old Chinese proverb one picture is worth 10,000 words, then this book is a treasure house of knowledge about the past, present, and future of our natural resources. Profusely illustrated with outstanding photographs. Grade V and up.

ELLIOTT, CHARLES N. *Conservation of American Resources*. Atlanta, Ga.: Turner E. Smith and Co., 1940. 672 p.

A story of the past, present, and future outlook of major natural resources in America, including wildlife, minerals, forests, water, soil, and parks. Contains messages by conservation leaders. Lists suggestions for study and activities at end of each chapter. Lists conservation works, readings in conservation, and sources of information. Has selected bibliographies and lists of agencies that serve conservation education. Well illustrated. Text simple and readable for students from sixth grade thru high school.

Books for Teachers and Library

CARTER, J. F. *Remaking America* (By Jay Franklin). Boston: Houghton Mifflin Co., 1942. 287 p.

A fresh viewpoint from the pen of a newsman, of the same old story of the dissipation and rehabilitation of the natural resources of America. Resources properly evaluated in war effort.

CHASE, STUART. *Rich Land, Poor Land*. New York: McGraw-Hill Book Co., 1936. 361 p.

Best and most interestingly written book on the resources of America, their original abundance, their exploitation, and steps toward rehabilitation. Special attention to TVA as symbol of new spirit of conservation in America. All important resources listed. Recommended for libraries and teachers.

GLOVER, KATHERINE *America Begins Again* New York. McGraw-Hill Book Co., 1939 382 p

Story of America's major resources with special emphasis on soil and water. Well written

PARKINS, A. F., and WHITAKER, J. R. *Our Natural Resources and Their Conservation* New York: John Wiley and Sons, 1936 646 p.

Written by a group of experts on major phases of natural and human resources. Emphasis on soil and water as the basic resources. Writing too mature for lower grades.

VAN HISE, CHARLES RICHARD *Conservation of Our Natural Resources*. (Edited by Loomis Havenmeyer and others.) New York: Macmillan Co., 1930 551 p

Minerals, water, forests, the land, wildlife, and conservation and mankind. Excellent as to approach and detail. Writing too mature for school children

SOIL

Books for Pupils and Classroom

BURGES, AUSTIN FARLI. *Soil Erosion Control* Atlanta, Ga. Turner E. Smith and Co., 1938 221 p

Junior high-school book based on details familiar to children and explaining technic of terraces, dams, contour furrows, and other erosion control. Each chapter contains section on field practice suggesting firsthand activities. For teachers and Grades VI-VIII

KEILLOGG, CHARLES F. *The Soils That Support Us*, New York: Macmillan Co., 1941. 370 p

A story of the soil, how it is made, the many forms or types in which it is found, and how it is used. Upper grades

LORD, RUSSELL *Behold Our Land* Boston: Houghton Mifflin Co., 1938 307 p

Case history of soils and related subjects. Stories that tell facts more dramatically than the facts themselves. Recommended for upper grades

Books for Teachers and Library

BENNETT, HUGH HAMMOND *Soil Conservation* New York: McGraw-Hill Book Co., 1939 993 p

Book of soils, their origin, use, and treatment

GUSTAFSON, A. F. *Soils and Soil Management* New York: McGraw-Hill Book Co., 1941 424 p

Story of soil formation, movement, and control in detail. Questions for study at ends of chapters. College grade

U. S. DEPARTMENT OF AGRICULTURE *Soils and Men*. Yearbook. Washington, D. C.: Government Printing Office, 1938 1232 p

Much that has been learned about soil is written in this book by competent soil specialists

Pamphlets and Bulletin

LORD, RUSSELL *To Hold This Soil* U. S. Department of Agriculture, Miscellaneous Publication No. 321, August 1938 Washington, D. C.: Government Printing Office 1938 122 p

U. S. DEPARTMENT OF AGRICULTURE *New Landmarks of Soil Conservation* Soil Conservation Service, Miscellaneous Publication No. 473 Washington, D. C.: Government Printing Office, 1942 20 p

See also other publications of the U. S. Department of Agriculture

WATER

Books for Pupils and Classroom

BALL, M E *The Wonders of Water* New York Farrar and Rinehart, 1938. 122 p.

Story of water told in an interesting way Includes the work of water, explains clouds, rain, vapor, dust, ice. Discusses the power of water and tells how water can be made pure enough for drinking Grades V-VIII

HOLWAY, HOPE K. *The Story of Water Supply*. New York Harper and Brothers, 1929. 134 p.

Man sometimes fails to use wisely the water he has and when the level of underground water becomes so low that wells run dry, farmers have to borrow water and city people have to buy it Grades V-VIII.

PRYOR, WILLIAM CLAYTON, and SLOMAN, HELEN *Water—Wealth or Waste*. New York Harcourt, Brace and Co., 1939. 242 p.

One of the most useful books for studying the conservation of water in relation to its effect on people Facts about city water systems, famous canals, water as a source of power, water mining and manufacturing, floods, flood control, and irrigation Grades VI-IX.

Pamphlets and Bulletins

PERSON, HARLOW S. *Little Waters* Washington, D C. Government Printing Office, 1936. 82 p.

Study of headwater streams and other little waters, their use and relation to the land

U S. DEPARTMENT OF AGRICULTURE *Farmstead Water Supply*. Farmers Bulletin 1448, Washington, D C. Government Printing Office, 1933 38 p

MINERALS, GEOLOGY

Books for Pupils and Classroom

FENTON, CARROLL LANL *Our Amazing Earth*. New York Doubleday, Doran and Co., 1938 346 p

Vivid story of geological history of the earth, fascinating, simple, clear Grades V-VIII

GRUENING, MARTHA. *The Story of Mining*. New York Harper and Brothers, 1931 163 p (City and Country Series)

Simple story of minerals, how they are made ready for everyday use, how they should be conserved Grades V-VIII.

SCHUCHERT, CHARLES, and LE VERNE, C M *Earth and Its Rhythms* New York D Appleton Century Co., 1927 409 p

Nontechnical and yet a clean-cut and interesting story on geology and the earth.

WYCOMBE, WALLACE H *All about Mining* New York Longmans, Green and Co., 1937 269 p

Conservation story of ores that come out of the ground to be made into minerals and how minerals are converted into the things we use in our daily lives Grades VII-VIII

Books for Teachers and Library

EMMONS, W. H., and OTHERS *Geology Principles and Processes* New York McGraw-Hill Book Co., 1939. 451 p.
Comprehensive book on geology.

KIESSLING, O. E. *Minerals Yearbook 1932-33* U. S. Dept. of the Interior, Bureau of Mines Washington, D. C. Government Printing Office, 1933. 819 p.

LOOMIS, FREDERIC BREWSTER *Field Book of Common Rocks and Minerals* New York: G. P. Putnam's Sons, 1923. 352 p.

Book for identifying the rocks and minerals of the United States and interpreting their origin and meanings

Pamphlets and Bulletins

CORNELL RURAL SCHOOL LEAFLET *U. S. Minerals and Us* Ithaca, N. Y. New York State College of Agriculture and the Department of Rural Education, 1942. 32 p.

Practical material in a subject that so far has been too meagerly treated in children's conservation material

FOREST AND FORESTRY

Books for Pupils and Classroom

ATWATER, MONTGOMERY M. *Flaming Forest* Boston Little, Brown and Co., 1941. 212 p.

Readable story of forest rangers and their work in the forests in the West, seen thru the eyes of a boy. Accurate and interesting. Grade V and up.

BUTLER, OVID M. *Rangers of the Shield*. Washington, D. C. American Forestry Association, 1934. 260 p.

A forest ranger's job is to protect forests from fire, keep trails open and telephone lines up, enforce hunting laws, and make tourists comfortable. Rangers have adventures and narrow escapes. In this collection are twenty-nine stories told by forest rangers. Grades VI-VIII.

PACK, CHARLES LATHROP. *The Forestry Primer*. Washington, D. C. American Tree Association, 1926. 32 p.

Simple lessons in forestry for the lower grades.

PACK, CHARLES LATHROP. *The School Book of Forestry*. Washington, D. C. American Tree Association, 1922. 159 p.

The importance of forests to man is vividly stressed. Grades VI-VIII.

PACK, CHARLES LATHROP, and GILL, TOM. *Forest Facts for Schools*. New York Macmillan Co., 1938. 336 p.

Deals with the forest as man's ally in civilization—the trees, the forest, its products and its enemies, and the science of forestry. Has exercises for field study and problem questions. Grades V-IX.

Books for Teachers and Library

ILLICK, JOSEPH S. *An Outline of General Forestry*. New York: Barnes and Noble, 1939. 297 p.

Includes insect enemies and their control by natural and artificial means, tree diseases and their control, protection of forests against fires. Presumably a book for students of forestry, but useful for teachers and curriculum specialists for conservation of forests. Authoritative.

MOON, F. F., and BROWN, N. C. *Elements of Forestry* New York: John Wiley and Sons, 1929. 409 p

Covers many elements of forest management in detail

Pamphlets and Bulletins

FEDERAL SECURITY AGENCY, U. S. OFFICE OF EDUCATION *Farm Forestry*. Vocational Division Bulletin 196 Washington, D. C.: Government Printing Office, 1939. 63 p

U. S. DEPARTMENT OF AGRICULTURE *Care and Improvement of Farm Woods* Farmers' Bulletin 1177 Washington, D. C.: Government Printing Office, 1926. 26 p

U. S. DEPARTMENT OF AGRICULTURE *Cutting Farm Woods Profitably* Agricultural Leaflet No. 30 Washington, D. C.: Government Printing Office, 1928. 4 p

U. S. DEPARTMENT OF AGRICULTURE *Forest Farming* Farmers' Bulletin 1794 Washington, D. C.: Government Printing Office, 1938. 18 p

TREES

Books for Pupils and Classroom

CHEYNEY, E. G. *What Tree Is That?* New York: D. Appleton-Century Co., 1930. 185 p

Excellent presentation of tree identification, covering approximately one hundred American trees. Simple language, capable of creating an interest in trees

COLLINGWOOD, GEORGE HARRIS *Knowing Your Trees* Washington, D. C.: American Forestry Association, 1941. 109 p

Simple text, close-up photographs of each tree in all seasons, close-up of leaves, flowers, fruit, and bark

ROGERS, JULIA E. *The Tree Book* New York: Doubleday, Doran and Co., 1931. 565 p

Guide to the trees of North America and to the use and cultivation of trees

Books for Teachers and Library

MATHEWS, F. SCHUYLER *Field Book of American Trees and Shrubs* New York: G. P. Putnam's Sons, 1923. 465 p

Identification book of all the trees in the United States, written in simple terms. Excellent reference work as well as field guide

SARGENT, CHARLES SPRAGUE *Manual of Trees of North America* Boston: Houghton Mifflin Co., 1933. 910 p

A guide to the trees of this continent. Complete, concise, and semitechnical. Excellent library reference book

VAN DERSAL, WILLIAM R. *Native Woody Plants of the United States* Washington, D. C.: Government Printing Office, 1938. 362 p

Thorough technical discussion.

Pamphlets and Bulletins

MATTOON, WILBUR R. *Forest Trees and Forest Regions of the United States*. U. S. Dept. of Agriculture Miscellaneous Publication No. 217 Washington,

D. C.: Government Printing Office, 1936. 55 p

FLOWERS

Books for Pupils and Classroom

HARVEY, JANE *Wild Flowers of America* Racine, Wis. Whitman Publishing Co., 1932 96 p

A simple guide book to wild flowers that every boy and girl can understand and appreciate. Grades I-VIII.

HOUSL, HOMER D. *Wild Flowers* New York: Macmillan Co., 1934 362 p.

Complete flower identification book with which the study of wild flowers is made simple. Grades I-VIII

MATHEWS, F. SCHUYLER *Book of Wild Flowers for Young People* New York. G. P. Putnam's Sons, 1923. 397 p

Books for Teachers and Library

GROSVENOR, GILBERT, SHAWAITER, W. J.; and GISK, E. J. *Book of Wildflowers.* Washington, D. C. National Geographic Society, 1933. 243 p

This book includes chapters on our wild flowers and grasses, representing some 250 species

MATHEWS, F. SCHUYLER. *Field Book of American Wild Flowers.* New York G. P. Putnam's Sons, 1929. 590 p

Identification book of flowers of woods, fields, and meadow

BIRDS

Books for Pupils and Classroom

ALLEN, ARTHUR A. *The Book of Bird Life.* New York D. Van Nostrand and Co., 1930 426 p

Excellent book to help children learn about birds. It tells ways of building sanctuaries, what kind of birdhouses to put up and where to put them, how to take bird walks and learn to see the birds and observe interesting things about them

ASHBROOK, FRANK G. *Birds of America* Racine, Wis. Whitman Publishing Co., 1932. 92 p

Good pocket identification manual with pictures. Grades V-VIII

CHAPMAN, FRANK M. *What Bird Is That?* New York D. Appleton Century Co., 1938 195 p

Identification manual describing appearance, habits, and habitat of common birds. Grades V-VIII

MATHEWS, F. SCHUYLER. *Book of Birds for Young People* New York G. P. Putnam's Sons, 1921. 323 p

Author describes his observations of common birds of North America at different months in entertaining style. Includes chapter on bird migrations and one on thirty-five common bird songs, with pages of musical notes and instructions for whistling. Grades VI-VIII.

PEARSON, T. GILBERT, editor. *Birds of America.* Garden City, N. Y. Garden City Publishing Co., 1936 289 p

Book of identification of birds by one of the foremost authorities on the subject. Easily understood

SHANLEY, FRANK N. *The Bird Book*. New York: Saalfield Publishing Co., 1936. 663 p.

A book to help in learning to recognize birds by songs, calls, and flight, and how best to study and conserve them. Grades III-VI

Books for Teachers and Library

GROSVENOR, GILBERT, and WETMORE, ALEXANDER, editors. *Book of Birds*. Washington, D. C.: National Geographic Society, 1939. 2 Vols.

HENDERSON, JUNIUS. *The Practical Value of Birds*. New York: Macmillan Co., 1934. 342 p.

Discusses the usefulness of birds as enemies of insects and plants harmful to the farmer

Pamphlets and Bulletins

U. S. DEPARTMENT OF AGRICULTURE. *Fifty Common Birds of Field and Orchard*. Farmer's Bulletin 514. Washington, D. C.: Government Printing Office, 1913. 31 p.

U. S. DEPARTMENT OF AGRICULTURE. *Food of Some Well Known Birds of Forest, Farm and Garden*. Farmer's Bulletin 506. Washington, D. C.: Government Printing Office, 1922. 34 p.

U. S. DEPARTMENT OF AGRICULTURE. *Homes for Birds*. Farmer's Bulletin 1456. Washington, D. C.: Government Printing Office, 1930. 22 p.

U. S. DEPARTMENT OF AGRICULTURE. *Some Common Birds Useful to the Farmer*. Farmer's Bulletin 630. Washington, D. C.: Government Printing Office, 1926. 29 p.

MAMMALS

Books for Pupils and Classroom

BRANSON, PAUL. *Animals of American History*. New York: Frederick A. Stokes Co., 1939. 59 p.

When the first white men came to America, many wild animals were more helpful than the early settlers first realized. This book tells about the wild horses, wild turkey, deer, beaver, moose, raccoon, fox, bison, fur seal, and others and explains why they need especial conservation today. Grades III-VI

CARR, WILLIAM H. *The Stir of Nature*. New York: Oxford University Press, 1930. 208 p.

Tells how to make exhibits, how to make plaster casts of animal tracks, and how to identify animals by the families to which they belong. Grades VI-VIII.

SETON, ERNEST THOMPSON. *Lives of Game Animals*. New York: Doubleday, Doran and Co., 1929. 8 Vols.

Excellent reading for advanced pupils

Books for Teachers and Library

ANTHONY, H. E. *Field Book of North American Mammals*. New York: G. P. Putnam's Sons, 1928. 625 p.

Guide book of identification and brief life histories of the animals of the continent

HAMILTON, WILLIAM JOHN. *American Mammals*. New York: McGraw-Hill Book Co., 1939. 434 p.
Good reference for teachers and libraries.

Pamphlets and Bulletins

SCHOONMAKER, W. J. *The Beaver Boy Series*. Albany, N. Y. American Humane Association, 135 Washington Ave., 1941.

A series of pamphlets about mammals written for children from eight to twelve years. Interesting, and beautifully illustrated with photographs by the author. Among the numbers in the series are *Grizzleyoat, the Woodchuck, Flattail, the Beaver, Whitetail, the Deer*. Grades IV-VIII

U. S. DEPARTMENT OF AGRICULTURE. *Breeding of Fur Animals*. Washington, D. C. Government Printing Office, 1937. p. 1379-95. Agricultural Yearbook, Separate 1603

U. S. DEPARTMENT OF AGRICULTURE. *Trapping on the Farm*. Washington, D. C. Government Printing Office, 1920. p. 451-84. Agricultural Yearbook 1919, Separate 823.

INSECTS

Books for Pupils and Classroom

KING, ELEANOR, and PLESSL, WELLMER. *Insect People*. New York. Harper and Brothers, 1937. 63 p.

Some insects are friends to man; others are deadly enemies. Both types are shown in the enlarged pictures in this book. Grades III-VIII

SHOWALTER, W. J., and OTHERS. *Our Insect Friends and Foes and Spiders*. Washington, D. C. National Geographic Society, 1935. 252 p.

Book of studies of interesting insects. Grades VII-VIII and older

TEALL, EDWIN W. *The Boys' Book of Insects*. New York. E. P. Dutton and Co., 1939. 237 p.

Definite directions with diagrams and pictures on how to keep an insect zoo, how to make an ant house, and how to mount butterflies and moths. Grades V-VIII.

Books for Teachers and Library

COMSTOCK, JOHN HENRY, and OTHERS. *Manual for the Study of Insects*. Ithaca, N. Y. Comstock Publishing Co., 1938. 401 p.

Authoritative work on insects

LUTZ, FRANK E. *Field Book of Insects of the United States and Canada*. New York. G. P. Putnam's Sons, 1935. 510 p.

Excellent identification book of insects. For library and field and laboratory work

FISHES

Books for Pupils and Classroom

MORGAN, ALFRED P. *An Aquarium Book for Boys and Girls*. New York. Charles Scribner's Sons, 1936. 180 p.

Tells how to set up an aquarium and keep it balanced, how to catch fish in brooks and small ponds, how to use a minnow seine, what fish to avoid in a "community tank." Discusses shiners, daces, American flag fish, sunfish, darters, eels. Grades IV-VIII

MORRIS, ANN H. *Field Book of Ponds and Streams*. New York: G. P. Putnam's Sons, 1939. 448 p.

A technical and authoritative work, interesting and attractive. It may be used as an identification manual both for grades and high school.

ROBERT, LOUIS. *Fishes, Their Journeys and Migrations*. New York: W. W. Norton Co., 1933. 270 p.

Might be called "The Romance of Fish Life." New approach to life under the waters of the earth. Grades VI-VIII

Books for Teachers and Library

JORDAN, DAVID STARR. *Fishes*. New York: D. Appleton Century Co., 1925. 773 p.

Brief and comprehensive book of fishes in the United States

LA GORGE, JOHN OLIVER. *The Book of Fishes*. Washington, D. C.: National Geographic Society, 1939. 367 p.

Comprehensive story and identification of life in fresh and salt water of North America. Life stories of 102 fishes. General story of fish and fish life.

SCHREINIVEN, RAYMOND M., and OTHERS. *Field Book of Fresh Water Fishes of North America North of Mexico*. New York: G. P. Putnam's Sons, 1938. 321 p.

Helpful for the identification of fishes found in fresh water of North America

Pamphlets and Bulletins

U. S. DEPARTMENT OF THE INTERIOR. *Aquatic Plants in Pond Culture*. Bureau of Fisheries Document 948. Washington, D. C.: Government Printing Office, 1923.

U. S. DEPARTMENT OF THE INTERIOR. *Propagation of Pond Fishes*. Bureau of Fisheries Document 1056. Washington, D. C.: Government Printing Office, 1929.

U. S. DEPARTMENT OF THE INTERIOR. *Propagation and Distribution of Food Fishes*. Bureau of Fisheries. Washington, D. C.: Government Printing Office, 1938.

REPTILES—AMPHIBIANS

Books for Pupils and Classroom

EHRIG, C. W. *Reptiles, Amphibians, and Fishes*. Chicago: Rand McNally and Co., 1930. 249 p.

This book is one of the *Our Great Outdoors* series. Facts about common snakes, lizards, turtles, crocodiles, frogs, toads, and fishes. Organization unusually helpful for the development of curriculum units. Grades VII-VIII.

POPE, CLIFFORD H. *Snakes Live and How They Live*. New York: Viking Press, 1937. 237 p.

Story of good snakes and bad snakes; the ones useful to man and the ones which are harmful. Grade VI and above

Books for Teachers and Library

DETMERS, RAYMOND L. *The Reptile Book* New York: Doubleday, Doran and Co., 1935. 472 p

Reptiles of the United States and Mexico. Identification and reference work

POPE, CLIFFORD H. *Turtles of the United States and Canada* New York: Alfred A Knopf, 1939. 343 p

Contains key and descriptions of many common turtles. Includes excellent photographs of turtles and their eggs. Discusses habits, such as hibernating, sunning, nesting, feeding, defense, and ability to adapt to captivity. Vocabulary difficult. Useful for teachers and advanced pupils. Helpful for curriculum maker

STEJNEGER, LEONHARD, and BARBOUR, THOMAS. *A Check List of North American Amphibians and Reptiles*. Cambridge, Mass.: Harvard University Press, 1933. 185 p

PARKS AND RECREATION

Books for Pupils and Classroom

LANOE, DIETRICH. *Nature Trails*. New York: D Appleton Century Co., 1927. 261 p

Series of stories and articles, some of which arise from the author's observations on farms, in city gardens, and in the forest. Some of the observations which the author includes in this book suggest things which readers can observe for themselves. Grades VI-VIII.

LORD, RUSSELL, editor. *Forest Outings*. Washington, D. C.: Government Printing Office, 1940. 311 p.

This book shows the relation of a seasonal vacation to the natural resources of our land. Grades IV-VIII and higher.

Books for Teachers and Library

JAMES, HARLEAN. *Romance of the National Parks*. New York: Macmillan Co., 1939. 240 p

History of the national park movement and stories of the various national parks. Excellent photographs.

Pamphlets and Bulletins

ENTIRE SERIES OF *National Park Service Bulletins* on all National Parks of the United States. Washington, D. C.: Government Printing Office

SUGGESTIONS FOR TEACHING CONSERVATION

Altho most of the following materials are for general use, a few bulletins of state departments are included as types for local use. Distribution of some of the latter is limited to the state where published, others, such as the California Science Guides, can be purchased by teachers without respect to their location within or without the state. Readers who contemplate the use of materials published by state departments other than their own should inquire about availability before ordering

BRISTOW, WILLIAM H., and COOK, KATHERINE M. *Conservation in the Education Program*. U. S. Dept. of the Interior, Office of Education, Bulletin 1937, No. 4. Washington, D. C.: Government Printing Office, 1938.

Tells how conservation is being taught in different elementary and secondary schools and gives samples of activities and curriculum units. Contains bibliographies and lists of conservation agencies. Very helpful

COLORADO STATE DEPARTMENT OF EDUCATION. *Colorado's Wealth*. A Bulletin on Conservation of Natural Resources. Denver, Colo.: State Department of Education, 1941. 136 p.

Basic information leading to an "understanding of land problems and the effects of the misuse of land resources on the entire population of our country."

CONSERVATION COMMISSION OF WEST VIRGINIA and STATE DEPARTMENT OF EDUCATION. *Units in Conservation*. Wheeling, W. Va.: State Department of Education, 1939. Vol. I, 120 p, Vol II, 128 p.

Suggestions for the development of units in conservation and their correlation with other subjects. Suggestions for organization of wildlife lodge.

Cornell Rural School Leaflet Periodical. Ithaca, N. Y.: New York State College of Agriculture and Department of Rural Education

The Cornell Rural School Leaflets, addressed to the rural pupils of New York State, are readable and very useful. Teachers outside of New York State can subscribe for the leaflets. Many are devoted to phases of conservation. Each year a special number addressed to teachers deals chiefly with suggestions on teaching. The children's numbers are also helpful to teachers. Conservation numbers are referred to on pages 26, 103, 113.

CROXTON, W. C. *Science in the Elementary School*. New York: McGraw-Hill Book Co., 1937. 454 p.

Altho not a book on the teaching of conservation exclusively, this book suggests helpful approaches to the study of conservation from the aspect of science instruction and is well adapted to the rural school.

EVANS, EVERETT F. "Fish." *A Manual of Conservation for Missouri Teachers*. No. 7. Jefferson City, Mo.: Missouri Conservation Commission, 1941. 37 p.

A manual of information and suggested study activities for pupils. One of a series of bulletins. Others are on mammals, birds, etc.

FEDERAL SECURITY AGENCY, U. S. OFFICE OF EDUCATION. *Conservation Excursions*. Bulletin 1939, No. 13. Washington, D. C.: Government Printing Office, 1940. 106 p.

Suggestions for planning and organizing field trips to study conservation firsthand. Contains chart showing where to go, what to observe, and what to do in connection with different natural resources

FEDERAL SECURITY AGENCY, U. S. OFFICE OF EDUCATION. *Curriculum Content in Conservation for Elementary Schools*. Bulletin 1939, No. 14. Washington, D. C.: Government Printing Office, 1940. 79 p.

Lists principles and issues concerned with conservation of the natural resources and gives examples of understanding, activities, and continuing interests which can be expected to result from a program of conservation education. Contains bibliography

FEDERAL SECURITY AGENCY, U. S. OFFICE OF EDUCATION *Teaching Conservation in Elementary Schools* Bulletin 1938, No 14. Washington, D. C.: Government Printing Office, 1940. 125 p.

Tells how to help children organize their conservation activities and includes suggestions for the development of a curriculum unit on the conservation of soil with all grades working together

GARDEN CLUB OF AMERICA *Conservation Guide* New York the Club, 598 Madison Ave., 1939. 46 p.

Suggestions for activities and surveys. Good bibliographies.

LOHMANN, RUTH. *Teaching Conservation of Wildlife Through 4-H Clubs*. U. S. Dept. of Agriculture, Bureau of Biological Survey, Extension Service, Miscellaneous Publication No. 291. Washington, D. C. Government Printing Office, 1938

Among the conservation suggestions for 4-H Club members are many that will be of use to teachers. The bulletin also contains information of use to teachers who desire to cooperate with 4-H Clubs

MULFORD, FURMAN LLOYD. *Beautifying the Farmstead* U. S. Department of Agriculture, Farmer's Bulletin No 1087. Washington, D. C. Government Printing Office, 1929. 38 p.

Written for general readers in readable, usable style, with diagrams and suggestions for planting

NEAGLE, MARGARET. *Conservation of the Natural Resources*. In "Santa Barbara County Units of Study for Teachers in Elementary Schools" Santa Barbara, Calif. Board of Education, Santa Barbara County, 1939.

Describes the school and community in which the unit was taught, explains the accomplishment expected of pupils at the primary, intermediate, and advanced levels, and includes the daily program and a diary account of the children's activities

NORTH DAKOTA STATE TEACHERS COLLEGE. *Youth and the Soil*. Mayville, N. Dak. State Teachers College, 1940 52 p (Mimeo) In cooperation with North Dakota State Extension Service and the Soil Conservation Service, U. S. Department of Agriculture Available from Regional Office, Soil Conservation Service, Terminal Building, Lincoln, Nebr

Bulletin showing how the cooperating agencies developed materials for a curriculum unit on conservation of soil taught by rural schools in the vicinity of the college.

PALMER, E. LAURENCE. "Conservation Education in the Schools." *Nature Magazine* 32 509-16; November 1939. (Also reprinted by American Nature Association, Washington, D. C.)

Suggestions for organizing teaching materials and a survey of progress made in conservation education, Bibliographies

RENNER, GEORGE T. *Conservation of National Resources*. New York: John Wiley and Sons, 1942. 228 p.

Presents history of conservation movement, problems in conservation of various resources, and curriculum methods and materials. Contains bibliographies of texts, supplementary reading, teachers' aids, films and other visual materials, and lists of agencies interested in conservation education Good book for teachers.

ROSS, W. A., and SCRANTON, L. L. *Landscaping the Farmstead*. U. S. Dept. of the Interior, Office of Education. Agricultural Series No. 51, Vocational Education Bulletin No. 189. Washington, D. C., Government Printing Office, 88 p.

Altho designed for use in high-school vocational agriculture, this bulletin contains helpful suggestions for the teacher of the upper elementary grades, including lists of flowers and shrubs and suggestions for diagraming, planning, and care that some young children can carry out.

Science Guide for Elementary Schools. Periodical. Sacramento, Calif.: State Department of Education

Bulletins of information to aid in the teaching of science. Nearly all have conservation information. Some numbers contain simple keys, such as keys to cone-bearing trees; to ferns, mosses, lichens, and related plants, and to birds. Most numbers contain suggestions for life activities and ideas for problems. All are intended chiefly for use in California schools, and especially to promote the cause of conservation education in California. Many are also very useful elsewhere.

Among the numbers which have most general usefulness are *Fresh Water Aquaria*, by Lea Reid, No. 10, May 1936; *Wild Flower Roads to Learning*, by Carl D. Duncan, No. 8, March 1938, *Desert Life*, by Gayle Pickwell, No. 7, February 1936; *Suggestions to Teachers for the Science Programs in Elementary Schools*, by Leo F. Hackall, No. 1, August 1934, *Soil, Its Use and Conservation*, by George W. Graves, No. 2, September 1937, *Insects as Enemies and Benefactors of Mankind*, by Carl Duncan, No. 3, October 1937.

WISCONSIN DEPARTMENT OF PUBLIC INSTRUCTION *Helps in Teaching Conservation in Wisconsin Schools*. Madison, Wis.: the Department, 1938. 102 p.

Contains suggestions for activities which children can carry out in connection with different resources, and bibliographies adjusted to grade levels in elementary and secondary schools.

WISCONSIN DEPARTMENT OF PUBLIC INSTRUCTION *Teaching Conservation in Wisconsin Schools*. Madison, Wis.: the Department, 1937. 68 p.

Contains outlines, information, and bibliographies useful for teachers. Includes such resources as soil, water, minerals, scenic and historic resources, forests and wild vegetation, wildlife.

WISCONSIN CONSERVATION LEAGUE. *The Soil Conservation for Wisconsin Schools*. Horicon, Wis.: the League, 1942. 36 p.

Suggestions to help teachers develop studies of the soil. Nine parts. Includes questions for study and observation.

WORDEN, NATHALIE M., and PERRY, ERNESTINE. *Growing Beauty*. Springfield, Mass. National Highway Beautification Council, 60 Sherman St., 1933. 64 p.

Contains helpful suggestions for activities, including a plan for the improvement of school grounds.

OTHER BIBLIOGRAPHIES

The following lists are bibliographies of materials useful to teachers and children in developing a background of information and experience needed for conservation education

Bibliography of Nature Study (Reprinted from Anna R. Comstock's *Handbook of Nature Study*) Ithaca, N. Y. Comstock Publishing Co., 1939.
A carefully annotated list of books on nature study helpful to pupils for understanding the principles of conservation. Some of the materials listed have definite conservation emphasis.

Learning Our Natural Resources Baltimore, Md. Enoch Pratt Free Library, 1937.
Selected materials for teachers and elementary-school pupils.

N. Y. STATE RURAL SCHOOL LEAFLET *The Elementary Science Library* Ithaca, New York State College of Agriculture and the Department of Field Education, Cornell University, September 1938.
Contains a bibliography by Eva L. Gordon, well selected and annotated. A particular interest in this list is a section of books costing not more than 5 cents, classified in groups for young children and older children.

FEDERAL SECURITY AGENCY, U. S. OFFICE OF EDUCATION *Choose a Book About Things To Be Conserved* Leaflet No. 60 Washington, D. C. Government Printing Office, 1941.
A bibliography addressed to children and interestingly illustrated.

FEDERAL SECURITY AGENCY, U. S. OFFICE OF EDUCATION *Conservation Films in Elementary Schools* Bulletin, 1941, No. 4 Washington, D. C. Government Printing Office, 1941. 38 p.
Discussion of films as aids in conservation. Reviews the more suitable films and gives suggestions for their use in connection with conservation units.

LEA, W. H. *Selected Films for American History and Problems* New York: Bureau of Publications, Teachers College, Columbia University, 1940.
Chapters I, II, and III.
Certain chapters contain descriptions of films useful for conservation instruction.

U. S. DEPARTMENT OF THE INTERIOR, OFFICE OF EDUCATION Washington, D. C. Government Printing Office. Bibliographies as follows:
Good References for Conservation Education in Elementary Schools, Bibliography No. 70 1938.
Good References on Conservation of Trees and Forests for Use in Elementary Schools, Bibliography No. 71 1938.
Good References on Conservation of Birds, Animals, and Wild Flowers for Use in Elementary Schools, Bibliography No. 72 1938.

U. S. DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE *Wildlife* Leaflet 180 Washington, D. C. Government Printing Office, 1941.
Lists a variety of useful publications.